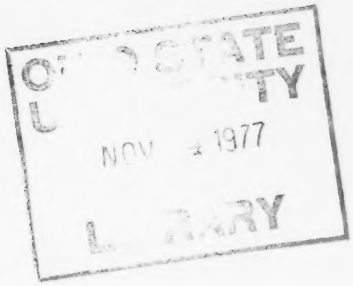

SELECTED WATER RESOURCES ABSTRACTS

VOLUME 10, NUMBER 2
JANUARY 15, 1977

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 10, NUMBER 2
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As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the Bio-Science Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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2. WATER CYCLE

2A. General

LIST OF PAPERS, 1967/1975, (INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH).
International Association for Hydraulic Research, Delft (Netherlands).
For primary bibliographic entry see Field 10C.
W77-00636

A STABLE ESTIMATOR FOR LINEAR MODELS: 2. REAL WORLD HYDROLOGIC APPLICATIONS,
Pavia Univ. (Italy).
For primary bibliographic entry see Field 2E.
W77-00640

SEASONAL SNOW ACCUMULATION, MELT AND WATER INPUT--A NEW ENGLAND MODEL,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
R. L. Hendrick, and R. J. DeAngelis.
Journal of Applied Meteorology, Vol. 15, No. 7, p 717-727, July 1976. 15 fig, 2 tab, 5 ref.

Descriptors: *Snowpacks, *Snowmelt, *Model studies, *Vermont, *New England, Precipitation(Atmospheric), Snowfall, Seasonal, Rainfall, Winter, Spring, Temperature, Elevation, Equations, Climatology, Estimating equations, Mathematical models, Watersheds(Basins), Runoff, On-site observations, Surveys, Snow surveys, Water resources, Meteorological data, Meteorology.

Two geographic parameters, elevation and latitude, account for much of the spatial variation of temperature and precipitation over New England during the winter and spring seasons. Since temperature controls the amount of precipitation which falls as snow and is highly related to snowmelt, a spatial seasonal climatology of snow accumulation, melt and water input can be derived by modeling the elevation and latitude effects on temperature and precipitation distributions. Such a model was developed primarily from Agricultural Research Service Sleepers River Watershed data in northern Vermont. Based only on predictor station temperature and precipitation observations and on elevation and latitude differences between predictor and predictand locations, snowpack accumulation, melt, and water input were estimated for 10-day time steps through the snow accumulation and melt season (2 November through 30 May). Using a low-elevation station to estimate snowpack at higher elevations, model estimations of snowpack water equivalent represented a 46% improvement over climatological averages. Comparable skill was obtained in specifying water input. Skill diminished with increasing predictor-predictand distance to near zero at about 100 mi (161 km). This model enabled much of the climatic and 10-day synoptic information on snowpack accumulation, melt, and water input over unobserved watersheds to be estimated from ordinary National Weather Service network temperature and precipitation observations. (Sims-ISWS)
W77-00646

ICE-BEARING CUMULUS CLOUD EVOLUTION: NUMERICAL SIMULATION AND GENERAL COMPARISON AGAINST OBSERVATIONS,
Rand Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 2B.
W77-00648

RESEARCH FOR THE DEVELOPMENT OF GUIDELINES FOR CONDUCTING AND ANALYZING AN ENVIRONMENTAL WATER QUALITY STUDY TO DETERMINE STATISTICALLY MEANINGFUL RESULTS,
Arkansas Univ., Fayetteville. Water Resources Research Center.
For primary bibliographic entry see Field 7B.
W77-00677

RESERVOIR SEDIMENTATION ASSOCIATED WITH CATCHMENT ATTRIBUTES, LANDSLIDE POTENTIAL, GEOLOGIC FAULT, AND SOIL CHARACTERISTICS,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2J.
W77-00779

SIMULATING EROSION DYNAMICS WITH A DETERMINISTIC DISTRIBUTED WATERSHED MODEL,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 4D.
W77-00788

DIGITAL SIMULATION OF AGGRADATION AND DEGRADATION IN NATURAL STREAMS,
New South Wales Univ., Kensington (Australia). Faculty of Military Studies.
For primary bibliographic entry see Field 2J.
W77-00818

PATTERNS OF SCOUR AND FILL IN POOL-RAPID RIVERS,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 2J.
W77-00837

COMPARISON OF SYSTEMS AND PHYSICAL HYDROLOGY APPROACHES TO HYDROLOGIC MODELLING,
Wollongong Univ. Coll. (Australia).
M. J. Boyd.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 35 - 39, June 1976. 5fig., 2 tab, 14 ref.

Descriptors: *Mathematical models, *Rainfall-runoff relationships, *Watersheds(Basins), Water storage, Systems analysis, Optimization, Storm runoff.

In mathematical modelling of the storm rainfall-runoff process, a systems approach treats the catchment as a single unit, and utilises parameters of limited physical significance. A physical hydrology approach considers the internal properties of the catchment, and interpretation of its parameters in terms of these properties is possible. A physically-based model is presented in terms of elements identified with the watershed bounded sub-areas of the catchment. This form of structure allows storage to be allocated accurately to the model elements using measured storage properties of the corresponding sub-areas. Parameters are evaluated from the catchment properties, leaving a minimum of optimisation for final fitting. The model is developed using data from ten catchments. The response characteristics of the model are shown to be superior to those of two models based on a systems approach. (CSIRO)
W77-00939

A REGIONAL STORMWATER DRAINAGE MODEL,
For primary bibliographic entry see Field 4A.
W77-00940

STATISTICAL SENSITIVITY OF PARAMETERS IN A RAINFALL-RUNOFF MODEL,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
R. G. Mein, and B. M. Brown.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 83 - 87, June 1976. 1 fig., 2 tab, 11 ref.

Descriptors: *Mathematical models, *Rainfall-runoff relationships, *Statistical methods, Streamflow forecasting, Watershed management, Land use, Watersheds(Basins), *Australia.
Identifiers: Thomson River(Vic).

A statistical analysis is presented whereby the statistical sensitivity of each parameter of a mathematical rainfall-runoff model can be estimated. Such an analysis is useful in assessing the potential of a mathematical model in predicting the effect of land-use change on catchment response, and the possibility of relating a models parameters to physical catchment characteristics and its consequent applicability to ungauged catchments. To illustrate the procedure, the Boughton model (with baseflow routines added) was applied to the Thomson River (Victoria, Australia). The results show that even when the model is good in predicting monthly streamflows, most of the individual parameters have a high variance, i.e. are imprecise. Indications are that, for this model at least, it would be difficult to show a statistically significant change in any single parameter due to any land use change. (CSIRO)
W77-00948

DEVELOPMENT OF A CONTINUOUS URBAN RAINFALL-RUNOFF MODEL,
Monash Univ., Clayton (Australia).
R. M. Wootton, and R. G. Mein.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 88 - 92, June 1976. 5 fig., 1 tab, 12 ref.

Descriptors: *Urban runoff, *Mathematical models, *Rainfall-runoff relationships, *Antecedent moisture content, Soil water movement, Infiltration, Urban hydrology, *Australia.
Identifiers: Yarralumla Creek(A.C.T.).

In order to overcome the limitations of discontinuous models of the rainfall-runoff process caused by the assumption of average antecedent conditions, a continuous model has been developed and tested using data from Yarralumla Creek catchment (Australian Capital Territory). This model simulates the soil moisture movement between storms and thus enables reasonable estimates of the antecedent conditions for any event. The infiltration component uses the Green-Ampt model, extended to simulate redistribution, and uses the Road Research Laboratory method for routing from previous and impervious areas. (CSIRO)
W77-00949

KINEMATIC WAVE THEORY APPLIED TO STORMFLOW FROM A MOUNTAIN CATCHMENT,
Melbourne and Metropolitan Board of Works (Australia).
For primary bibliographic entry see Field 4C.
W77-00950

THE APPLICATION OF THE SACRAMENTO RAINFALL MODEL TO A LARGE ARID CATCHMENT IN WESTERN AUSTRALIA,
Snowy Mountains Engineering Corp., Cooma (Australia).
G. P. Codner, and F. M. J. Ribeny.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia,

Preprints of Papers, p. 98 - 102, June 1976. 4 fig., 3 tab., 6 ref.

Descriptors: *Arid climates, *Large watresheds, *Rainfall-runoff relationships, *Model studies, *Australia, Streamflow forecasting, Design flood, Spillways, Evapotranspiration, Antecedent moisture content, Unit hydrographs, Arid lands.
Identifiers: *Fortescue River(WA).

Use of the Sacramento rainfall runoff model is described for the Fortescue catchment in the northwest of Western Australia. The objectives of the study were the extension of the observed streamflow sequence and estimation of the spillway design flood at Gregory Gorge. These were achieved by calibrating the model, on a daily basis, on eight years of recorded data, then using the parameters in a 6-hourly version to calibrate a unit hydrograph from observed flood data. It is concluded that potential evapotranspiration estimates were less important than in a temperate climate. The amount of impervious area is important for low and medium runoff events as this represents the only runoff contribution. Flood estimates were found to be sensitive to assumptions on initial conditions of the soil moisture stores and the unit hydrograph chosen. (CSIRO)
W77-00951

2B. Precipitation

STATISTICAL MODELS FOR PRECIPITATION,
Kentucky Water Resources Research Inst., Lexington.
Z. Govindarajulu, P. Purdue, and F. Ciochi.
Available from the National Technical Information Service, Springfield, VA 22161, as PB-259 270, Price codes; A03 in paper copy, A01 in microfiche. Research Report No. 96, August, 1976. 39 p, 10 tab, 13 ref. OWRT A-055-KY(1). 14-31-0001-5017. 14-34-0001-6018.

Descriptors: *Rainfall disposition, *Kentucky, *Rainfall intensity, *Simulated rainfall, *Distribution patterns, *Model studies, Precipitation(Atmospheric).

Available data consist of daily rainfall for the past 24 years (1948-1972) for Lexington, Louisville and Paducah. For Ashland the data are available for the period of 40 years (1932-1972). The problem is to find an appropriate family of distributions indexed by a suitable number of parameters that fits the maximum daily rainfall. Further, there might be seasonal variations. The following seasons were considered: (1) Dry Convective season: August 1-October 30; (2) Early Convective season: May 1-July 31; (3) Late Convective season: November 1-April 30. After extracting the yearly maximums for each of these seasons fittings were made of three distributions for each station; one for each season. The first attempt was to fit Gumbel's type I extreme value distributions, differing in location and scale parameters, to the maximum daily rainfall. However, the type I model for Louisville was rejected. Next, the Cauchy type of extreme value distribution was considered and an equation was derived. A separate model should be fitted for each of the stations, namely Lexington, Louisville, Ashland and Paducah. A separate model can also be used for each season. It seems reasonable to combine into a single season the Early and Late seasons for Lexington, the Dry and Early seasons for Louisville and Paducah, and all the seasons into a single season for Ashland.
W77-00537

ITERATIVE METHOD OF DETERMINING AQUIFER CONSTANTS,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
M. A. Gill.
Journal of the Irrigation and Drainage Division, Proceedings of ASCE, Vol. 101, Paper No. IR1, p 81-85, March 1975. 1 fig, 1 ref, 2 append.

Descriptors: *Aquifer characteristics, *Aquifers, *Aquifer testing, *Mathematical studies, *Theis equation, Methodology.
Identifiers: Iterative method.

In the proposed method, it is possible to consider as many terms in the series of the generalized equation as may be significant for calculating the aquifer constants. Therefore, the method can be considered as a refinement or extension of Jacob's method in which only the first two terms of the series are considered. It can be compared with the Theis method in which the 'match' of the drawdown curve with the type curve is obtained graphically. In the proposed method, the 'match' is obtained algebraically. The aquifer constants determined by the proposed method satisfy the generalized equation for the two selected values of s and r2/t. Because the two points are selected from a smooth curve passing through the test data, the fit generally is good at all the other points also. (Skogerboe-Colorado State)
W77-00555

RAINFALL VARIATIONS AS INFLUENCED BY WIND AND TOPOGRAPHY,
Michigan State Univ., East Lansing. Dept. of Agricultural Engineering.
G. E. Merva, N. D. Strommen, and E. H. Kidder.
Journal of Applied Meteorology, Vol. 15, No. 7, p 728-732, July 1976. 6 fig, 2 tab, 6 ref.

Descriptors: *Rainfall, *Rain gages, *Measurement, *Michigan, Watersheds(Basins), Precipitation(Atmospheric), Winds, Topography, Seasonal, Meteorological data, Meteorology.
Identifiers: *Rainfall variations, *Deer-Sloan Creek(Mich), Wind effects, Rain gage exposure.

Precipitation catch variation as influenced by wind direction and speed, topography, and season was examined for the Deer-Sloan Creek watershed, located about 10 mi southeast of Michigan State University, East Lansing. Data for a 10-year period from dual traverse recording rain gages, calibrated twice a year, were ranked for each precipitation event by wind direction and speed. The annual frequency distribution of first-place rankings was arrayed by wind direction and speed to assess the possible influence of surrounding terrain on gage catch. A strong correlation was found to exist between the gage exposure and the surrounding topography as a function of the first-place rankings. (Sims-ISWS)
W77-00647

ICE-BEARING CUMULUS CLOUD EVOLUTION: NUMERICAL SIMULATION AND GENERAL COMPARISON AGAINST OBSERVATIONS,
Rand Corp., Santa Monica, Calif.
L. R. Koenig, and F. W. Murray.
Journal of Applied Meteorology, Vol. 15, No. 7, p 747-762, July 1976. 8 fig, 24 ref, 2 append. Navy N00228-75-C-2121, NSF DES 75-03459.

Descriptors: *Model studies, *Cloud physics, *Precipitation(Atmospheric), Mathematical models, Simulation analysis, Computer models, Clouds, Drops(Fluids), Ice, Crystals, Rime, Nucleation, Particle size, Cloud seeding, Rainfall, Meteorology.
Identifiers: *Cloud models.

A two-dimensional (axisymmetric) numerical cloud model with parameterized microphysics for water drops and ice particles was described. The parameterized liquid-phase processes included condensation, evaporation, autoconversion of small drops to large ones, and collection of small drops by large ones. The solid-phase processes included heterogeneous sorption nucleation, homogeneous contact nucleation, deposition, sublimation, riming and melting. Both liquid and solid particles may precipitate. The model was used to simulate three different conditions of ice generation as a function of temperature: (1) based on classical concepts of the activity of heterogeneous ice-forming nuclei--suggesting continental cumuli; (2) based on field observations of much greater concentrations of ice particles at warmer temperatures than indicated measurements of heterogeneous ice nuclei--suggesting maritime cumuli; and (3) based on nucleus seeding practice when the goal is to stimulate the growth of cumulus clouds. General comparisons of model simulation against observation were satisfactory and showed that the microphysical parameterizations capture many of the observed properties of glaciating clouds with regard to the locations and sizes of liquid and solid hydrometeors. The variation of hydrometeor properties with time was reasonably satisfactory although no single simulation properly captured the sequence of hydrometeor evolution observed in maritime cumuli. The results supported the concept of dynamic seeding to stimulate cloud growth but suggested caution with regard to equating greater vertical growth and greater rainfall on the ground. (Sims-ISWS)
W77-00648

FINESTRUCTURE AND MICROSTRUCTURE OBSERVATIONS DURING THE PASSAGE OF A MILD STORM,
Washington Univ., Seattle. Dept. of Oceanography; and Washington Univ., Seattle. Applied Physics Lab.
For primary bibliographic entry see Field 2L.
W77-00653

TRENDS AND PERIODICITIES OF RAINFALL IN SUB-DIVISIONS OF MAHARASHTRA STATE,
Meteorological Office, Poona (India).
V. K. Raghavendra.
Indian Journal of Meteorology and Geophysics, Vol. 25, No. 2, p 197-210, April 1974. 11 fig, 3 tab, 6 ref.

Descriptors: *Rainfall, *Distribution patterns, *Frequency analysis, Monsoons, Seasonal, Annual, Data processing, Rainfall disposition, Precipitation(Atmospheric), Rain, Precipitation intensity, Rainfall intensity, Meteorological data, Weather data, Analytical techniques, Meteorology.
Identifiers: *India, *Maharashtra State(India), *Rainfall trends.

The Maharashtra State of India is divided into four meteorological subdivisions, Konkan, Madhya Maharashtra, and Vidarbha. Of these, Madhya Maharashtra and Marathwada are prone to droughts. For all the subdivisions the principal rainy season is the monsoon season of June to September when over 80% of the annual rainfall is received. The coefficient of variation is about 20% for the annual and monsoon rainfall except in Marathwada where it is 25%. The annual and monsoon rainfalls follow the normal distribution for their yearly frequencies. In this State, the annual and the monsoon rainfall series are highly correlated. In the less drought-prone subdivision of Konkan, the annual and monsoon rainfalls show a 100-year cycle. In all the subdivisions the successive years' rainfalls are not dependent. The trend as revealed by fitting of orthogonal polynomials was shown as a quadratic curve for the annual and monsoon rainfalls of Konkan and Madhya Maharashtra, the subdivisions on either side of the Western Ghats. The low pass filter and Mann-Kendall test against randomness confirmed the trend in Konkan rainfall. The power spectral analysis of the data indicated the existence of a long-term, slow increasing trend for monsoon rainfall of Konkan and 60-year cycle for the annual rainfall of Konkan and Madhya Maharashtra, 30-year

cycle for the annual and monsoon rainfall of Vidarbha, 20nyear cycle for the monsoon rainfall of Marathwada, 15-year cycle for the monsoon rainfall of Madhya Maharashtra, 7.5-year cycle for the annual and monsoon rainfall of Marathwada. (Sims-ISWS)
W77-00661

AN EXPERIMENT IN THE PRODUCTION OF 'POP' FORECASTS USING A STATISTICAL MODEL,
National Weather Service, Honolulu, Hawaii. Pacific Region.
G. Hirata.
NOAA Technical Memorandum NWSTM PR-15, September 1976. 16 p, 5 fig, 1 tab, 5 ref, 2 append.

Descriptors: *Statistical models, *Precipitation(Atmospheric), *Forecasting, *Rainfall, Weather data, Computer programs, *Hawaii, *Model studies.
Identifiers: 'POP' forecasts.

In November 1971, the National Weather Service in Hawaii commenced production of subjective 'POP' (probability of precipitation) forecasts for four Hawaiian weather stations: Hilo on the island of Hawaii; Kahului, Maui; Honolulu, Oahu; and Lihue, Kaual. This paper describes the method used in producing these forecasts and presents some of the results of the experiment. The computer program consisted of: a program for estimating the parameters in the logistic function (by maximum likelihood involving non-linear iterative techniques); and prediction of the probability of precipitation using estimated coefficients on current observed data. Independent parameters decided upon after testing were: sea level pressure; temperature of the air; dew point; and the presence or absence of precipitation at the time of observation. In almost all of the forecast periods, the probabilities were mainly in the lower and upper ranges, from 20-40% and 70-90% respectively, and these were quite reliable. In the mid-levels, however, the computer had a tendency to overforecast. (NOAA)
W77-00889

A RECORD ARKANSAS RAINFALL - THE EL DORADO DELUGE,
National Weather Service, Fort Worth, Tex. Southern Region.
K. M. Labas.
NOAA Technical Memorandum NWS SR-86, August 1976. 17 p, 5 fig.

Descriptors: *Precipitation excess, Evaporation, Convection, Meteorological data, Rainfall, Entrainment, Storms, *Arkansas, *Rainfall intensity.
Identifiers: Evaporative cooling, Convective downdrafts, El Dorado(Ark).

During the four day period 5-8 June, 1974, much of the Southern Plains and Lower Mississippi Valley was struck by a series of violent storms including killer tornadoes, severe thunderstorms and floods. One significant facet of the outbreak was the occurrence of over 18 inches (45 cm) of rain in less than 12 hours in Union County Arkansas. This phenomenal release, proceeding the absence of any apparent terrain interaction, was quite unexpected and is the subject of this investigation. The data reveals additional circumstances which were present over the impact area and may have had a significant role to play. These include: (1) a persistent dome of low theta w air near the surface in south Arkansas which was initiated by an afternoon squall meso-system and perpetuated through the night by evaporative cooling and convective downdrafts; (2) a very high and cold tropopause over the area; (3) the convective area, once formed, remained stationary with cells moving through it and; (4) massive cell diameters allowed minimal outside entrainment and maximum rain producing efficiency. The circumstance mainly responsible for the 18 inch release near El Dorado was the thrust of the moist Gulf air being lifted over the dome of low theta w air and simultaneously cooled aloft under the mid tropospheric short wave. (NOAA)
W77-00897

STATISTICAL, METEOROLOGICAL AND DEPTH-AREA ANALYSIS OF RAINFALL,
Israel Meteorological Service, Bet Dagan; and Israel Ministry of Transport and Communications, Tel-Aviv.
N. Rosenan, R. Markovitz, and Y. Shashua.
Final Report, (1976). 31 p, 4 tab, 17 ref. ESSA-E-4-67(N).

Descriptors: *Rainfall, *Forecasting, *Hydrologic data, *Meteorological data, Hydrology, Statistics, *Meteorology, Statistical methods.
Identifiers: International Hydrological Decade, *Mediterranean Sea, *Statistical analysis, Israel.

A research project was designed to cover several points of hydrometeorological research, for which it was thought that data available locally could be usefully applied, in order to assist in the solution of problems which are of general interest for the advancement of hydrology within the framework of the International Hydrological Decade. The program formulated provided statistical analysis of a long years (105 years) rainfall series and its application to hydrological middle-range and long-range forecasting: (1) the occurrence and disappearance of 'singularities', according to portions of the series (say, every 20 or 30 years); (2) fluctuations in the distribution of daily rainfall according to magnitude within the 105 years of record; (3) conclusion: applicability of the results to hydrological considerations. Correlations between rainfall in the Central Mediterranean and in the Eastern Mediterranean, and possible explanation by typical configurations of the 500 mb surface could give tools for long-range precipitation forecasts. (NOAA)
W77-00900

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME II. PHYSICAL OCEANOGRAPHY AND METEOROLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00911

BOUNDARIES OF ARID REGIONS, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
For primary bibliographic entry see Field 7C.
W77-01032

2C. Snow, Ice, and Frost

WATER RESOURCE AUGMENTATION IN THE SOUTHWEST.
For primary bibliographic entry see Field 3B.
W77-00546

SEASONAL SNOW ACCUMULATION, MELT AND WATER INPUT--A NEW ENGLAND MODEL,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
For primary bibliographic entry see Field 2A.
W77-00646

ICE-BEARING CUMULUS CLOUD EVOLUTION: NUMERICAL SIMULATION AND GENERAL COMPARISON AGAINST OBSERVATIONS,
Rand Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 2B.
W77-00648

DEPOSITS FORMED BY SUBGLACIAL PRECIPITATION OF CAC03,
California Univ., Los Angeles. Dept. of Geology.
For primary bibliographic entry see Field 2K.
W77-00658

INFLUENCE OF ICE UPON CONSTRUCTION, AND METHODS OF COMBATTING ICE PROBLEMS.
Army Cold Region Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 8A.
W77-00663

AIRFLOW PATTERNS AND SNOW ACCUMULATION IN A FOREST CLEARING,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W77-00726

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 1. MARINE MAMMALS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00901

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 14. ICE.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00914

2D. Evaporation and Transpiration

THERMAL DISTURBANCES OF WHEAT WATER METABOLISM IN MODELS OF NATURAL METEOROLOGICAL COMPLEXES, (IN RUSSIAN),
Akademiya Nauk SSSR, Sverdlovsk. Inst. of Soil Sciences and Agrochemistry.
For primary bibliographic entry see Field 3F.
W77-00755

SUSPENDED SEDIMENT, SOLAR RADIATION AND HEAT IN AGRICULTURAL RESERVOIRS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 2J.
W77-00809

WATER USE ON RANGELANDS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 3B.
W77-00846

ACCURACY OF EVAPOTRANSPIRATION RATES DETERMINED BY THE WATER-BUDGET METHOD, GILA RIVER FLOOD PLAIN, SOUTHEASTERN ARIZONA,
Geological Survey, Tucson, Ariz.
R. L. Hanson, and D. R. Dawdy.
Available from the Supt. of Documents, GPO, Washington, DC 20402, Price $1.05. Professional Paper 655-L 1976. 35 p, 17 fig, 20 tab, 13 ref.

Descriptors: *Evapotranspiration, *Flood plains, *Arizona, *Hydrologic budget, *Statistical methods, Reliability, Vegetation, Phreatophytes, Hydrologic data, Precipitation(Atmospheric), Riparian water loss, Soil moisture, Surface-groundwater relationships, Water balance.
Identifiers: Southeastern Arizona.

Evapotranspiration by phreatophytes (primarily saltcedar) was determined by the water-budget method for 5,500 acres (2,230 ha) of the Gila River flood plain in southeastern Arizona. The water budget consists of 12 components including surface and subsurface flow through the study area, precipitation on the area, and soil-moisture changes in the unsaturated soil profile. Nine years (1963-71) of hydrologic data were collected on four reaches within the area. These data provided over 400 measurements of evapotranspiration for two- or three-week periods. Midway through the study the vegetation was removed from the flood plain. The evapotranspiration measurements are therefore defined for both natural vegetative cover and essentially bareground conditions. This report shows how each component of the water budget was evaluated, demonstrates the significance of each component in relation to the total evapotranspiration, and describes the methods used to evaluate the relative accuracy of each component. The two most significant components of the water budget are, generally, the Gila River inflow and outflow. One of the least significant is tributary inflow, which occurred only 4 percent of the time during the 9-year study. Large computed measurement errors are shown to overestimate substantially the true measurement variable in evapotranspiration. The computed errors do give, however, a good indication of the relative significance of each evapotranspiration value and provide a means of selecting those values which should be used in computing average evapotranspiration rates. (Woodard-USGS)
W77-00868

2E. Streamflow and Runoff

A STABLE ESTIMATOR FOR LINEAR MODELS: 2. REAL WORLD HYDROLOGIC APPLICATIONS,
Pavia Univ. (Italy).
L. Natale, and E. Todini.
Water Resources Research, Vol. 12, No. 4, p 672-676, August 1976. 7 fig, 4 ref.

Descriptors: *Unit hydrographs, *Flood routing, Hydrology, *Estimating, Surface runoff, Rainfall-runoff relationships, Forecasting, Analytical techniques, Equations, Model studies, Hydrologic data, *Model studies.
Identifiers: *Arno basin, *Sieve River, *Italy, Constrained estimator, Linear model.

Two examples flood routing through a confluence of two watercourses of the Arno basin and the rainfall-runoff process in the Sieve River basin, were presented to illustrate the application of a stable estimator for linear models. Six flood hydrographs were considered for the Arno basin, and the instantaneous unit hydrographs were obtained for the two watercourses assuming the phenomenon of wave propagation in the drainage network as linear. A constrained stable estimator was shown to yield the best results in evaluating the parameters. In the Sieve River basin, effective rainfall hyetographs and the surface runoff hydrographs were affected by errors because of the usual and somehow arbitrary methods used to separate the surface components of the inflow and outflow discharges. Mean instantaneous unit hydrographs were determined for both constrained and unconstrained estimators by using four to eight rainfall-runoff events. A constant superiority for the constrained estimator was demonstrated. (See also W77-00123) (Singh-ISWS)
W77-00640

FREE SURFACE FLOW IN A CHANNEL OF LARGE RELATIVE ROUGHNESS,
Technical Univ. of Istanbul (Turkey), Dept. of Hydraulics and Water Power.
M. Bayazit.
Journal of Hydraulic Research, Vol. 14, No. 2, p 115-126, 1976. 11 fig, 23 ref.

Descriptors: *Roughness(Hydraulic), *OPen channel flow, *Laboratory tests, *Boundary layer, Viscosity, Hydraulics, Analytical techniques, Turbulence, Flumes, Statistics, Equations, Flow, Friction.
Identifiers: *Hemispherical roughness elements, Velocity distribution, Relative roughness, Equivalent sand roughness.

Characteristics of free surface flow over a bed consisting of hemispherical roughness elements were studied in a laboratory model. Theoretical bottom of the channel was located at a distance of 35% of the diameter below the tops of hemispheres. Usual logarithmic laws were valid for velocity distribution and friction factor as long as flow depth was large relative to roughness height. Equivalent sand roughness of the bottom was equal to 2.5 times the diameter of hemispheres. At large values of relative roughness on the other hand, lower velocities were observed than the logarithmic law predicts, and friction factor also increased by as much as 50%. Intensity of turbulence fluctuations decreased with the increase of relative roughness. Probability density function of velocity fluctuations near the rough bed tended away from the normal distribution. (Singh-ISWS)
W77-00649

INTEGRAL-EQUATION ANALYSIS OF FLOWS OVER ERODING BEDS,
Mississippi Univ., University. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-00682

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART II. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME 2. BASINS FROM ARROYO GRANDE TO OREGON STATE LINE EXCEPT CENTRAL VALLEY.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W77-00857

HISTORY OF IRRIGATION AND CHARACTERISTICS OF STREAMFLOW IN NEBRASKA PART OF THE NORTH AND SOUTH PLATTE RIVER BASINS,
Geological Survey, Lincoln, Nebr.
F. B. Shaffer.
Open-file report 76-167, June 1976. 98 p, 10 fig, 14 ref.

Descriptors: *Streamflow, *Flow rates, *Irrigation canals, *Surface waters, *Nebraska, Hydrologic data, Flow characteristics, Probability, Statistical methods, Diversion, Irrigation, Water rights, History.

Statistics on streamflow for selected periods of time are presented for 28 gaging sites in the Nebraska part of the North and South Platte River basins. Monthly mean discharges, monthly means in percent of annual runoff, standard deviations, coefficients of variation, and monthly extremes are given. Also tabulated are probabilities of high discharges for 1 day and for 3, 7, 15, 30, and 60 consecutive days and of low discharges for 1 day and for 3, 7, 14, 30, and 60 consecutive days. All statistics are based on records that are representative of 1973 conditions of streamflow. Brief historical data are given for 27 of the principal irrigation canals diverting from the North and South Platte Rivers. (Woodard-USGS)
W77-00859

EFFECT OF SEQUENCE LENGTH N ON THE CHOICE OF ASSUMED DISTRIBUTION OF FLOODS,
Geological Survey, Reston, Va.
J. R. Wallis, N. C. Matalas, and J. R. Slack.
Water Resources Research, Vol 12, No 3, p 457-471, June 1976. 17 tab, 1 ref.

Descriptors: *Flood frequency, *Design flood, *Flood damage, *Numerical analysis, *Equations, Methodology, Hydrogeology, Design data.

Although overdesign and underdesign losses vary with the length n of flood sequences, the choice of flood frequency distribution for estimating the design flood is not overly sensitive to n. Bias in the estimate of the design flood does not account for differences in the analytical forms of the underlying and optimal assumed distributions of floods. (Woodard-USGS)
W77-00861

EFFECTS OF CHANGES IN AN ALLUVIAL CHANNEL ON THE TIMING, MAGNITUDE, AND TRANSFORMATION OF FLOOD WAVES, SOUTHEASTERN ARIZONA,
Geological Survey, Menlo Park, Calif.
D. E. Burkham.
Available from the Supt. of Documents, GPO, Washington, DC 20402, Price $0.75. Geological Survey Professional Paper 655-K, 1976. 25 p, 11 fig, 2 tab, 21 ref.

Descriptors: *Open channel flow, *Alluvial channels, *Channel morphology, *Flow rates, *Flood discharge, Flash floods, Flood routing, Velocity, Meanders, Reservoir operation, Evaluation, *Arizona.
Identifiers: *Gila River(Ariz), *Safford Valley(Ariz), Flood-wave timing.

The stream channel of the Gila River in Safford Valley, Ariz., is wide and straight at ends of periods in which high flows were dominant and is narrow and has a meander pattern at ends of periods in which low flows were dominant; therefore, the size and meander pattern of the stream channel are regarded as having been determined by past dominant flows. The stream-channel and flood-plain system, when fully developed for a dominant flow, has a persistent characteristic in regard to its effect on floods. A low-flow system reduces flood rates; peak flows of flash floods may be reduced to bankfull discharge. A high-flow system does not increase flood rates; however, streamflow from tributaries may contribute more significantly to peak rates when a high-flow system is in effect than when a low-flow system is in effect. At the downstream end of the study reach, the annual peak flows reflect the effects of the persistent characteristic of the upstream system and, therefore, are not random in time. A high-flow system was in effect during 1914-27; a low-flow system began developing after about 1930. The downstream velocity of the center of mass of floodwaves that had peak discharges of between 10,000 and 20,000 cubic feet per second during 1914-27 may have been three times that for the same rates during 1943-70. (Woodard-USGS).
W77-00869

FLOOD-PLAIN DELINEATION FOR CAMERON RUN BASIN, FAIRFAX COUNTY--ALEXANDRIA CITY, VIRGINIA,
Geological Survey, Reston, Va.
P. L. Soule.
Open-file report 76-443, 1976. 94 p, 46 fig, 5 tab, 4 ref.

Descriptors: *Flood plains, *Mapping, *Flood profiles, *Flood recurrence interval, *Land development, Watersheds(Basins), Urbanization, Forecasting, Urban hydrology, Projections, Floods, Maps, Contours, *Virginia.
Identifiers: *Fairfax County(Va), *Alexandria(Va), Flood boundaries, 25-year flood, 50-year flood, 100-year flood, Cameron Run Basin(Va).

Flood-Plain Delineation for Cameron Run Basin Water-surface profiles of the 25-, 50-, and 100-year recurrence interval discharges have been computed for all streams and reaches of channels in Fairfax County, Virginia, having a drainage area

greater than 1 square mile except for Dogue Creek, Little Hunting Creek, and that part of Cameron Run above Lake Barcroft. Maps having a 2-foot contour interval and a horizontal scale of 1 inch equals 100 feet have been used for a base on which flood boundaries were delineated for 25-, 50-, and 100-year floods to be expected in each basin under ultimate development conditions. Included are techniques employed in computing discharges and profiles as well as the flood profiles and maps on which flood boundaries have been delineated for that part of Cameron Run basin below Lake Barcroft in both Fairfax County and the city of Alexandria. (Woodard-USGS)
W77-00870

FREQUENCY ANALYSIS OF FLOOD DATA IN QUEENSLAND (AUSTRALIA),
Department of Primary Industries, Brisbane (Australia).
For primary bibliographic entry see Field 4A.
W77-00936

THE MATHEMATICAL MODELLING OF RIVERS,
Meteorology Bureau, Brisbane (Australia). Hydrometeorology Section.
For primary bibliographic entry see Field 2E.
W77-00941

THE MATHEMATICAL MODELLING OF RIVERS,
Meteorology Bureau, Brisbane (Australia). Hydrometeorology Section.
K. J. Morris.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 45 - 49, June 1976. 1 fig., 1 tab., 6 ref.

Descriptors: *Mathematical models, *Streamflow forecasting, *Flood routing, *Urban runoff, Computer models, Urban hydrology, Storm runoff, Channel flow, Roughness(Hydraulic), Unit hydrographs, Backwater, *Australia.
Identifiers: Brisbane(Qld.).

During a general study of flooding problems in creeks traversing the developed area of Brisbane (Australia), a suite of computer programmes was produced to give effect to a general mathematical model. The model blends hydraulics with hydrology in using backwater profiles with flood routing and variable unitgraph techniques. The balance between hydrology and hydraulics has been found to be self-correcting to a degree, in that if the flow is consistently incorrect (e.g. a low initial rating curve), the roughness coefficients will be estimated high. The net result is that over a medium range of flows the levels will be within an acceptable error margin. Details of the model and its component programmes are given, with some examples of its use. (CSIRO)
W77-00941

FLOOD ENVELOPES AND FREQUENCIES FOR THE BRISBANE RIVER (AUSTRALIA),
Brisbane City Council (Australia). Dept. of Water Supply and Sewerage.
For primary bibliographic entry see Field 4A.
W77-00942

STEINBECK V PHILIP STENGER SONS, INC (ALTERATION OF HIGHER TOPOGRAPHY BY LAND DEVELOPER CAUSING ARTIFICIAL DRAINAGE ONTO LOWER PROPERTY--THE TAKING ISSUE).
345 NE2d 633-40 (Ohio Ct App 1975). 8 p.

Descriptors: *Ohio, *Water courses(Legal aspects), *Topography, *Drainage, *Judicial decisions, Penalties(Legal), Water law, Adjacent land owners, Drainage effects, Controlled drainage, Legal aspects, Boundaries(Property), Common law, Developed waters, Drainage systems.
Identifiers: Proximate causation, Injunctive relief, Intentional torts.

Plaintiff owners of lower residential land brought suit for damages and injunctive relief against a developer-owner of higher lands alleging alterations of surface water drainage. The Ohio Court of Appeals held that an owner of a dominant urban estate cannot without liability alter natural watercourses on his property so that surface water flowing onto a subservient estate is so increased in volume or intensity as to damage that estate. An award of punitive damages was allowed. (Reinders-Florida)
W77-01049

2F. Groundwater

MODELING OF NONCONTINUOUS FORT UNION AND MESAVERDE SANDSTONE RESERVOIRS, PICEANCE BASIN, NORTHWESTERN COLORADO,
For primary bibliographic entry see Field 4B.
W77-00637

PARAMETER IDENTIFICATION IN AN INHOMOGENEOUS MEDIUM WITH THE FINITE-ELEMENT METHOD,
California Univ., Los Angeles.
Y. S. Yoon, and W. W-G. Yeh.
Society of Petroleum Engineers Journal, Vol. 16, No. 4, p 217-226, August 1976. 3 fig, 2 tab, 34 ref. UCLA-WRC-W-290.

Descriptors: *Aquifer characteristics, *Permeability , *Heterogeneity, *Finite element analysis, Numerical analysis, Mathematical models, Optimization, Unsteady flow, Groundwater movement, Dupuit-Forchheimer theory, Porous media, Least squares method, Boundaries(Surfaces), Equations.
Identifiers: *Inverse problem, Parameter identification, Galerkin method, Predictor-corrector technique, Indirect method, Effective porosity, Gauss-Newton method.

The development of a systematic procedure for solving the problem of parameter identification was studied. The parameter function to be identified was the permeability embedded in nonlinear, partial differential equation of parabolic type. Finite elments were used to represent the unknown function parametrically in terms of nodal values over a suitable discretization of a flow region. These nodal values were then determined by a least-squares fitting between the observed and calculated flow potentials, subject to linear inequality constraints imposed upon the parameters to be identified. To handle such constraints, Rosen's gradient projection technique was combined with the Gauss-Newton method. Numerical procedures were presented for the solution of the partial differential equation using the Galerkin method and a predictor-corrector approach. Simultaneous identification of 25 parameters embedded in a two-dimensional, nonlnear, diffusion-type equation was demonstrated by two examples. (Visocky-ISWS)
W77-00638

EVALUATING GROUND-WATER PATHS USING HYDRAULIC CONDUCTIVITIES,
Agricultural Research Service, Chickasha, Okla. Texas-Oklahoma Area.
J. W. Naney, D.C. Kent, and E. H. Seely.
Ground Water, Vol. 14, No. 4, p 205-213, July-August 1976. 14 fig, 13 ref.

Descriptors: *Hydraulic conductivity, *Groundwater, *Oklahoma, *Groundwater movement, *Hydrogeology, Effluent streams, Flow nets, Mathematical models, Watersheds(Basins), Subsurface flow, On-site investigations, Computer programs, Potentiometric level, Seepage, Mapping, Cores, Pump testing, Particle size, Permeameters, Model studies.
Identifiers: *Flow paths(Groundwater), Residual maps, Streamtubes.

A method was presented for selecting groundwater flow paths by comparing modeled and measured hydraulic conductivity distributions. A flow chart was included which shows the steps followed in selecting the concept of roundwater flow which best fits measured hydrogeologic conditions. Both noneffluent and effluent stream conditions were evaluated using the method. Residual maps of hydraulic conductivity were used to show how modeled hydraulic conductivity may be as much as 300 times that expected when the wrong concept is used. Flow nets of modeled and measured data downstream from a flood-water-retarding structure were developed using the selected hydrogeologic conditions. Fitting hydraulic conductivity data resulted in a distribution of groundwater flow paths which better represent actual flow conditions. The method provided a unique means of calibrating a model in a pilot test area and applying it to geologically similar nearby watersheds. It was also useful for checking paths of subsurface flow where flow distribution is important as it is in the movement of chemical pollutants or nutrients from a source of recharge, such as a watershed impoundment, to downstream waters. (Visocky-ISWS)
W77-00651

HYDROGEOPHYSICAL EQUIVALENCE OF WATER SALINITY, POROSITY AND MATRIX CONDUCTION IN ARENACEOUS AQUIFERS,
National Physical Research Lab., Pretoria (South Africa). Geophysics Div.
P. F. Worthington.
Ground Water, Vol. 14, No. 4, p 224-232, July-August 1976. 4 fig, 9 ref.

Descriptors: *Resistivity, *Salinity, *Porosity, *Sand aquifers, Sands, Sandstones, Geophysics, Aquifer characteristics, Sodium chloride, Conduction, Equations, Groundwater, Mapping, Curves, Heterogeneity, Graphical analysis, Hydrogeology.
Identifiers: Formation factor, Rock matrix.

The value of the electrical resistivity method as a quantitative indicator of groundwater resistivity, porosity, and effective matrix resistivity was examined through the equivalence of these parameters as manifested in the surface-measured resistivity of heterogeneous water-saturated sands. It was demonstrated that, where there were unknown variations in porosity, the mapping of groundwater resistivity was most feasible at lower salinities and where porosity was relatively high. Porosity could be determined most exactly at lower values and where groundwater salinity was relatively high. Both of these approaches became less efficient as matrix conduction increased. The mapping of effective matrix resistivity was best effected at lower values where this parameter could be approximately monitored against moderate variations in both porosity and groundwater resistivity. In general, however, where there were unknown and pronounced variations in any two of these parameters, the geoelectrical determination of the third could be so ambiguous that the uncertainty in the estimated value of this parameter could exceed the total range of values encountered in an entire formation. (Visocky-ISWS)
W77-00652

GROUND-WATER LEVELS AND WELL RECORDS FOR DISCONTINUED OBSERVATION WELLS IN IDAHO, 1915-72: PART A,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 7C.
W77-00854

GROUND-WATER LEVELS AND WELL RECORDS FOR DISCONTINUED OBSERVATION WELLS IN IDAHO, 1915-72: PART B,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 7C.
W77-00855

GROUND-WATER LEVELS AND WELL RECORDS FOR DISCONTINUED OBSERVATION WELLS IN IDAHO, 1915-72: PART C,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 7C.
W77-00856

HYDROGEOLOGY OF A DRIFT FILLED BEDROCK VALLEY NEAR LINO LAKES, ANOKA COUNTY, MINNESOTA,
Geological Survey, Denver, Colo.
T. C. Winter, and H. O. Pfannkuch.
Journal of Research of the U. S. Geological Survey, Vol 4, No 3, p 267-276, May-June 1976. 8 fig, 2 tab, 10 ref.

Descriptors: *Hydrogeology, *Groundwater movement, *Glacial aquifers, *Minnesota, Data collections, Observation wells, Aquifer characteristics, Surface-groundwater relationships, Water levels, Groundwater recharge, Transmissivity, Hydraulic conductivity.
Identifiers: *Anoka County(Minn), Bedrock valleys.

The bedrock surface of east-central Minnesota is dissected by an intricate network of valleys. These valleys, as much as several hundred feet deep and filled with drift, dissect important sandstone and carbonate-rock aquifers of lower Paleozoic age. A small segment of one of the valleys, in southeastern Anoka County (test site A), is about 335 ft deep and 260 ft below the bedrock surface. Outside the bedrock valley at site B, 3 mi from site A, 100 ft of drift overlies the bedrock surface. Observation wells were installed at the two sites to determine the vertical ground-water movement between the various aquifer units and the lateral movement between the two sites. An aquifer test of the lowest valley-fill aquifer at site A showed that the observation well completed in the same aquifer as the pumping well responded immediately; whereas a lag of about 100 min occurred between the lower valley fill and upper-most body of sand and gravel. This indicates that the hydraulic connection between these two layers is poor at the immediate site. Test results show that the lower sand-and-gravel aquifer has a transmissivity between 14,000 and 27,000 sq ft/d. Laboratory analyses of drill cuttings show fair agreement with the hydraulic conductivity derived from aquifer-test analyses. Water-level data for a 2-yr period indicate that there are no reversals in ground-water potential with time. (Woodard-USGS)
W77-00860

AVAILABILITY OF GROUND WATER IN THE AREA SURROUNDING THE TRIDENT SUBMARINE CONSTRUCTION FACILITY, KITSAP COUNTY, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4B.
W77-00862

COMPUTER SIMULATION MODEL OF THE PLEISTOCENE VALLEYFILL AQUIFER IN SOUTHWESTERN ESSEX AND SOUTHEASTERN MORRIS COUNTIES, NEW JERSEY,
Geological Survey, Trenton, N. J.
H. Meisler.
Water-Resources Investigations 76-25, May 1976. 70 p, 3 fig, 1 plate, 3 tab, 14 ref.

Descriptors: *Aquifers, *Hydraulic properties, *Computer models, *Groundwater movement, Aquifer characteristics, *New Jersey, Pleistocene Epoch, Sands, Storage coefficient, Specific yield, Transmissivity, Water wells, Water yield, Glacial drift, Till, Gravels.
Identifiers: Passaic River(NJ), Morris County(NJ), Essex County(NJ), Newark group, Valley fill.

A finite-difference digital computer model was developed to simulate a buried valley-fill aquifer consisting of outwash sand and gravel deposited in a series of valleys cut into bedrock of Triassic age. Till, clay, silt, and muck function as an overlying semiconfining layer. The bedrock which is represented as an unconfined aquifer and the valley fill are in hydraulic connection. Calibration of the model was achieved by comparing model-computed water-level declines with measured declines at 12 observation wells during the period 1953-71. During calibration, changes in several hydraulic properties were tested. The most significant changes were changes in hydraulic conductivity of the semiconfining layer. The amount of water available from the valley-fill aquifer on a continuing basis, determined using the criterion that water levels would not decline below 30 feet above the base of the aquifer, is approximately 40 Mgal/d or about 40 percent more than the 1972-73 withdrawal rates. (Woodard-USGS)
W77-00865

GEOLOGY AND GROUND-WATER RESOURCES OF CAMDEN COUNTY, NEW JERSEY,
Geological Survey, Trenton, N. J.
G. M. Farlekas, B. Nemickas, and H. E. Gill.
Water-Resources Investigations 76-76, June 1976. 146 p, 50 fig, 14 tab, 84 ref.

Descriptors: *Groundwater resources, *Hydrogeology, *Aquifer characteristics, *Water quality, *New Jersey, Pumping, Drawdown, Water yield, Water utilization, Water wells, Chemical analysis, Groundwater recharge, Groundwater movement, Saline water intrusion, Atlantic coastal plain.
Identifiers: *Camden County(NJ).

The major fresh water aquifers in Camden County, N. J., are in the unconsolidated sediments of Cretaceous and Tertiary age. The major aquifers are the sand and gravel units in the Potomac Group and the Raritan and Magothy Formations, the Cohansey Sand, the Wenonah Formation-Mount Laurel Sand, and the Englishtown Formation. The average ground-water use for Camden County was 68 million gallons per day for 1966. All of the major artesian aquifers have had potentiometric head declines due to ground-water withdrawals. The largest water-level decline occurred in the aquifer system in the Potomac Group and the Raritan and Magothy Formations. At Haddon Heights the potentiometric head declined over 110 feet from 1900 to 1968. In the aquifer in the Wenonah Formation-Mount Laurel Sand the potentiometric head declined 43 feet in about 60 years. The quality of ground water is generally good. In the southeastern portion of the county chloride concentrations in excess of 250 mg/liter occur in the Potomac-Raritan-Magothy aquifer system. The high chloride water has remained in the aquifer system from the time of deposition or has re-entered the system from the ocean after the changes in sea level. The greatest potential of future ground-water development is from the Cohansey Sand which is under water table conditions. It also may have the greatest possibility of local ground-water contamination. (Woodard-USGS)
W77-00866

2G. Water In Soils

ON RADIOACTIVE WASTE MANAGEMENT: AN ANALYSIS OF THE PARAMETERS CONTROLLING SUBSURFACE CONTAMINANT TRANSFER,
Alberta Univ., Edmonton. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W77-00551

MIGRATION OF SALT FROM FEEDLOT WASTE AS AFFECTED BY MOISTURE REGIME AND AGGREGATE SIZE,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 5B.
W77-00558

NITROGEN TRANSFORMATIONS OF AMMONIUM SULFATE AND ALANINE IN SUBMERGED MAAHAS CLAY,
Philippines Univ., College. Coll. of Agriculture.
For primary bibliographic entry see Field 5B.
W77-00639

HYDRAULIC FUNCTIONS OF SOILS FROM PHYSICAL EXPERIMENTS AND THEIR APPLICATIONS,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
R. H. Brooks, and C. Su.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 547, Price codes: A07 in paper copy, A01 in microfiche. Oregon Water Resources Research Institute, Corvallis, Completion Report WRRI-41, May 1976. 130 p, 18 fig, 57 ref, 4 append. 10. OWRT C-5270(No. 4218)(1).

Descriptors: Hydraulics, *Saturation, Soils, *Pore pressure, *Distribution patterns, *Permeability, Retention, *Soil physical properties, *Soil water movement.
Identifiers: *Pearson Type VIII distribution function, *Pore-size distribution function, Imbibition.

Based upon the Pearson Type VIII distribution function, a general retention function which relates the saturation to the capillary pressure in disturbed soils has been discovered. This simple and yet complete function has been shown to describe precisely the imhibition as well as the drainage branch of the retention curve. It is defined by four readily assessed parameters that either have physical significance themselves or may be used to determine some hydraulic properties of the soil. With the assumption that the Burdine integrals are adequate, a relative permeability function has been derived through the substitution of the retention function for the integrands in the Burdine integrals. The permeability function is expressed in terms of the incomplete Beta function ratio whose value may be conveniently found in some mathematical tables. Further, a general pore-size distribution function of soils has been obtained from the retention function. The derivation of the pore-size distribution function enables more rigorous examination and further exploration of the theories concerning water movement in partially saturated soils. In this respect, and explanation of the phenomenon of air entrapment during imbibition has been offered through an energy concept based upon the pore-size distribution function along with the retention function.
W77-00667

EXPERIMENTS TO INVESTIGATE SUBSTANTIAL LOAD OF SOILS AND TO PREDICT THE LONG TERM EFFECTS OF WASTES ON GROUND WATER, (IN GERMAN),
Ministry of Agricultural Experiment Station, Brunswick (West Germany).
For primary bibliographic entry see Field 5B.
W77-00703

EROSION POTENTIAL OF SOILS,
Soil Conservation Service, Washington, D.C. Soil Survey Interpretations Div.
For primary bibliographic entry see Field 2J.
W77-00776

SOIL RIPPING TREATMENTS FOR RUNOFF AND EROSION CONTROL,
Forest Service (USDA), Albuquerque, N. M. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W77-00795

MILD SLOPE STABLE CHANNELS. A STOCHASTIC DESIGN APPROACH,
Florida Univ., Gainesville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-00896

SOILS OF THE MESHED TRACT IN SOUTHWESTERN TURKMEN SSR, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
B. B. Karryev.
Probl Osvoeniya Pustyn' 2, p 47-53. 1975.

Descriptors: *Soil physical properties, *Soil chemical properties, *Soil erosion, Grazing, *Erosion control.
Identifiers: *Turkmen-SSR, USSR.

The morphological physico-chemical and chemical properties of the soils were studied. To improve utilization of the land for grazing, water supply and soil erosion control of the massif should be intensified.--Copyright 1976, Biological Abstracts, Inc.
W77-00975

EFFECT OF SOIL MOISTURE ON DELIVERY OF NITROGEN-15 TO WINTER WHEAT PLANTS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Institut Fiziologii Rastenii i Agrokhimii.
E. S. Tkachuk, S. I. Slukhai, P. S. Kirnos, and M. A. Grinchuk.
Fiziol Biokhim Kul't Rast 7(3), p 261-265, 1975.

Descriptors: *Soil moisture, *Nitrogen, *Wheat, Drought, Moisture content, Aging, Vegetation.
Identifiers: England, *Nitrogen-15, Winter wheat.

A sudden soil drought releases delivery of 15N into the above ground organs of wheat. Under conditions of constant moisture deficit in soil the adaptive reactions in young plants results in a high intensity of N renewal. At the end of vegetation the processes weaken, due to early aging.--Copyright 1976, Biological Abstracts, Inc.
W77-01035

2H. Lakes

AN INVESTIGATION INTO THE EFFECT AND CAUSE OF EUTROPHICATION IN GEORGETOWN LAKE, MONTANA,
Montana State Univ., Bozeman. Water Resources Research Center.
For primary bibliographic entry see Field 5C.
W77-00536

ALIPHATIC HYDROCARBONS IN SEDIMENTS OF LAKE WASHINGTON,
Washington Univ., Seattle. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W77-00643

SURFACE NORMAL MODES OF LAKE MICHIGAN: CALCULATIONS COMPARED WITH SPECTRA OF OBSERVED WATER LEVEL FLUCTUATIONS,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
D. B. Rao, C. H. Mortimer, and D. J. Schwab.
Journal of Physical Oceanography, Vol. 6, No. 4, p 575-588, July 1976. 9 fig, 4 tab, 11 ref.

Descriptors: *Water level fluctuations, *Lake Michigan, *Lakes, *Wisconsin, *Model studies, Mathematical models, Water levels, Bays, Tides, Seiches, Fluctuations, Limnology.
Identifiers: *Water oscillations, *Green Bay(Wis), Surface normal modes, Spectra of water levels, Galerkin method.

Periods and structures of several normal modes of Lake Michigan (including Green Bay) were calculated theoretically, taking into account the Lake's topography and the earth's rotation. The calculations were based on a Galerkin method developed by Rao and Schwab. Even though the calculations gave both rotational and gravitational modes, attention was focused primarily on the latter. The calculations showed that there were several modes dominant in the main basin of Lake Michigan and some dominant in Green Bay. The lowest Lake Michigan mode had a period of 9.27 h. Green Bay exhibited a (co-oscillating or Hemlholtz) mode with a period 10.35 h. For the modes dominant in the main basin, the periods and structures obtained from theoretical calculations were compared to those deduced from spectral analyses of water level data from various stations around the Lake. The agreement was found satisfactory for several of the lowest modes. (Sims-ISWS)
W77-00655

STRATIFIED WATERS AS A KEY TO THE PAST,
Hamburg Univ. (West Germany). Geologisch-Palaontologisches Institut.
For primary bibliographic entry see Field 2J.
W77-00659

IMPROVING THE QUALITY OF WATER RELEASES FROM RESERVOIRS BY MEANS OF A LARGE DIAMETER PUMP,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W77-00668

DEMONSTRATION OF WATER QUALITY ENHANCEMENT THROUGH THE USE OF THE GARTON PUMP,
Oklahoma Water Resources Research Inst. Stillwater.
For primary bibliographic entry see Field 5G.
W77-00669

SEDIMENT CHARACTERISTICS AND THE TROPHIC STATUS OF FOUR OREGON LAKES,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5B.
W77-00673

AN AQUEOUS ENVIRONMENTAL SIMULATION MODEL FOR MID-SOUTH LAKES AND RESERVOIRS,
Arkansas Univ., Fayetteville. Coll. of Engineering.
For primary bibliographic entry see Field 5C.
W77-00675

PLANKTONIC CRUSTACEA OF THE RESERVOIR OF CUBILLAS NEAR GRANADA, (IN SPANISH),
Granada Univ. (Spain). Lab. of Ecology; and Granada Univ. (Spain). Dept. of Zoology.
R. M. Martinez-Silvestre.
Cuad Cienc Biol Univ Granada 3, p 5-14, 1974.

Descriptors: *Copepoda, *Crustaceans, Plankton, Reservoirs, Europe, *Daphnia.
Identifiers: Alona-rectangula, Bosmina-longirostris, Ceriodaphnia-reticulata, Cubillas, Daphnia-hyalina, Daphnia-longispina, Megacyclops-viridis-viridis, Tropocyclops-prasinus, *Granada(Spain).

The 7 existing species, 2 of which belong to the Copepods and the other 5 to the Cladocera classified. The relative abundance of each species, in the samples of superficial net plankton were taken periodically for 1 yr. The existing species are: Copepoda: Megacyclops viridis viridis and Tropocyclops prasinus; Cladocera: Ceriodaphnia reticulata, Bosmina longirostris, Daphnia longispina, D. hyalina and Alona rectangula.--Copyright 1976, Biological Abstracts, Inc.
W77-00683

THE SEDIMENTS OF LAKE GEORGE (UGANDA). I: REDOX POTENTIALS, OXYGEN CONSUMPTION AND CARBON DIOXIDE OUTPUT,
Malaya Univ., Kuala Lumpur (Malaysia). School of Biological Sciences.
For primary bibliographic entry see Field 5C.
W77-00712

SOME THEORETICAL CONSIDERATIONS OF THERMAL DISCHARGE IN SHALLOW LAKES,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5C.
W77-00716

PHYTOPLANKTON SUCCESSION IN A MATURING NORTHWEST TEXAS RESERVOIR (LAKE MEREDITH),
West Texas State Univ., Canyon. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-00720

NUMERICAL MODELS OF LAKE CURRENTS,
Case Western Reserve Univ., Cleveland, Ohio.
For primary bibliographic entry see Field 5B.
W77-00722

WATER POLLUTION INVESTIGATION: ERIE, PENNSYLVANIA AREA,
Betz Environmental Engineers, Inc., Plymouth Meeting, Pa.
For primary bibliographic entry see Field 5C.
W77-00724

SEDIMENTATION IN BIRCH LAKE, IOWA COUNTY, WISCONSIN,
Soil Conservation Service, Madison, Wis.
For primary bibliographic entry see Field 2J.
W77-00785

SUSPENDED SEDIMENT, SOLAR RADIATION AND HEAT IN AGRICULTURAL RESERVOIRS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 2J.
W77-00809

LAKE POWELL SEDIMENTATION SURVEYS,
Bureau of Reclamation, Salt Lake City, Utah. Div. of Planning.
For primary bibliographic entry see Field 2J.
W77-00819

THE MACROPHYTE VEGETATION OF FIVE LAKES IN VEFSN, NORDLAND COUNTY, NORTH NORWAY, (IN NORWEGIAN),
For primary bibliographic entry see Field 5C.
W77-00823

DISTRIBUTION OF RESERVOIR SEDIMENT--IOWA AND MISSOURI DEEP LOESS HILLS,
Agricultural Research Service, Columbia, Mo. North Central Watershed Research Center.
For primary bibliographic entry see Field 2J.
W77-00825

SEDIMENT DISPERSAL IN WESTERN LAKE MICHIGAN NEAR TWO CREEKS, WISCONSIN, AND THE INFLUENCE OF AN INDUSTRIAL COOLING WATER DISCHARGE,
Wisconsin Univ., Madison. Sea Grant Program; and Wisconsin Univ., Madison. Geo-Environmental and Mineral Resources Program.
For primary bibliographic entry see Field 2J.
W77-00841

COASTAL EROSION IN EASTERN LAKE MICHIGAN,
University of South Florida, Tampa. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W77-00842

SOURCES OF ARSENIC IN STREAMS TRIBUTARY TO LAKE CROWLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W77-00867

THE TEMPERATURE OF TWO WELSH LAKES AND ITS EFFECT ON THE DISTRIBUTION OF TWO FRESHWATER INSECTS,
University Coll. of North Wales, Bangor. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W77-00878

REVEALING CERCARIA OF THE FAMILY SCHISTOSOMATIDAE IN THE KIEV WATER RESERVOIR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5C.
W77-00881

THE EFFECT OF GRAVEL DREDGING ON RESERVOIR PRIMARY PRODUCTION, INVERTEBRATE PRODUCTION, AND MUSSEL PRODUCTION.
Tennessee Wildlife Resources Agency, Nashville.
For primary bibliographic entry see Field 5C.
W77-00895

AQUATIC OLIGOCHAETA RECOREDED FROM CANADA AND THE ST. LAWRENCE GREAT LAKES,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
R. O. Brinkhurst.
Pacific Marine Science Report 76-4, January 1976. 51 p. 7 plates, 20 ref.

Descriptors: *Aquatic animals, *Canada, *Oligochaetes, *Systematics, Speciation, Tubificids, *Annelids, Worms, *Great Lakes.
Identifiers: *Lumbriculidae, *Haplotaxidae. *Naididae.

A systematic classification of annelids (Oligochaeta), including Lumbriculidae, Haplotaxidae and Naididae found in Canada is presented. It gives the Canadian locale where found, a description of familial characteristics, and a guide to identification of the various species. Plates illustrate setae, penes, and proboscises. (Auen-Wisconsin)
W77-00925

ASBESTOS IN THE GREAT LAKES BASIN WITH EMPHASIS ON LAKE SUPERIOR, A REPORT TO THE INTERNATIONAL JOINT COMMISSION FROM THE GREAT LAKES RESEARCH ADVISORY BOARD.
International Joint Commission-United States and Canada, Windsor (Ontario). Great Lakes Water Quality Board.
For primary bibliographic entry see Field 5B.
W77-00927

CLADOPHORA IN THE GREAT LAKES,
Limnos Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5C.
W77-00928

AN APPROACH TO A RELATIVE TROPHIC INDEX FOR CLASSIFYING LAKES AND RESERVOIRS. (A PRELIMINARY ANALYSIS OF NATIONAL EUTROPHICATION SURVEY DATA COLLECTED DURING THE 1972 SAMPLING PERIOD).
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W77-00930

A PLAN FOR MICHIGAN'S SHORELANDS.
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 6B.
W77-00958

INSTITUTIONAL ARRANGEMENTS FOR LAKE MANAGEMENT IN WISCONSIN,
Wisconsin Univ., Madison. Environmental Resources Unit.
For primary bibliographic entry see Field 6E.
W77-00966

CORPORATE RESPONSIBILITY IN SILVER BAY,
For primary bibliographic entry see Field 5G.
W77-00980

INDEPENDENCE OF THE BIOCHEMICAL AND SPECIES COMPOSITION OF PLANKTON OF THE MINGECHAUR AND VARVARA RESERVOIRS, (IN RUSSIAN),
S. B. Gadzhieva.
Izv Akad Nauk Az Ssr Ser Biol Nauk 4, p 72-79, 1974.

Descriptors: *Biochemistry, *Copepods, *Zooplankton, Reservoirs, *Daphnia, *Phytoplankton.
Identifiers: Arctodiaptomus-acutilobatus, Azerbaijan-SSR, Cyclops-vicinus, Daphnia-longispina-hyalina, Diaphanosoma-brachyurum, Macrocyclops-fuscus, Mesocyclops-dybowskii, Sinodiaptomus-sarsi, USSR, *Mingechaur Reservoir(USSR), *Varvara Reservoir(USSR).

Data are presented on the biochemical composition and calorific values of the dominant species or groups of species of plankton in the Mingechaur and Varvara reservoirs in the Azerbaijan SSR (USSR): Diatomeae, Nitzschia, Diaphanosoma brachyurum, Daphnia longispina hyaiina, Sindiaptomus sarsi, Arctodiaptomus acutilobatus, Mesocyclops dybowskii, Cyclops vicinus, Macrocyclops fuscus and nauplii of copepods. The calorific value of the zooplankton was almost twice higher than that of the phytoplankton; if the average calorific value of the phytoplankton was equal to 2.45, then that of copepods was 4.78 and of cladocerans 4.67 kcal/g dry matter.
W77-01018

PHYSICAL-CHEMICAL AND PLANKTONOLOGICAL QUANTITATIVE STUDIES OF THE GREAT LAKE OF LAFFREY (YEARS 1970, 1971 AND 1973), (IN FRENCH),
Bordeaux-3 Univ., Talence (France). Lab. of Zoology.
For primary bibliographic entry see Field 5C.
W77-01019

PLANKTON COMMUNITIES OF THREE MAZURIAN LAKES AND CHLOROPHYLL CONTENT IN THEIR PHYTOPLANKTON, (IN POLISH),
Instytut Rybactwa Srodladowego, Olsztyn-Kortowo (Poland).
For primary bibliographic entry see Field 5C.
W77-01029

NUMBER AND BIOMASS OF OLIGOCHAETA OF THE SPECIES POTAMOTHRIX HAMMONIENSIS MICH. IN LAKES DUSIA, GALSTAS, OBELIJA AND SLAVANTAS IN 1968-1971, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius. Institut Zoologii i Parazitologii.
For primary bibliographic entry see Field 5C.
W77-01033

THE TIME AND THE CAUSE OF EXTERMINATION OF LAKE BALLS FROM LAKE ZELLER, (IN JAPANESE),
Yamagata Univ. (Japan). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-01034

STUDIES ON THE BOTTOM FAUNA OF FIVE LAKES IN SOUTHERN HOKKAIDO (LAKES HIKOTSU-KO, KUTTARA-KO, TOYA-KO, HANGETSU-KO AND OSHIMA O-NUMA, (IN JAPANESE),
Mieken Science Education Center, Yokkaichi (Japan).
For primary bibliographic entry see Field 5C.
W77-01037

THE PHYSICAL-CHEMICAL CONDITIONS OF THE WATERS OF THE LAKE OF ORTA DURING THE PERIOD FROM 1964 TO 1970, (IN ITALIAN),
For primary bibliographic entry see Field 5C.
W77-01038

ANTHROPOGENIC MORPHOGENESIS OF THE RELIEF OF THE LOWER DON, (IN RUSSIAN),
Rostov-on-Don State Univ. (USSR).
P. F. Molodkin.
Izv Sev-Kavk Nauchntsentra Vyssh Shk Estestv Nauki 3(1), p 94-97, 1975.

Descriptors: Agriculture, *Classification, Reservoirs, Ponds, Forest management, Mining, Waste disposal.
Identifiers: *Anthropogenic relief, *Morphogenesis, USSR, *Don River(USSR).

Anthropogenic morphogenesis is defined as the totality of processes and phenomena related to the activities of man and society to change the present-day relief of the earth's surface. The relief and contemporary gemorphologic processes in the Lower Don basin were analyzed. Anthropogenic relief-forming processes are classified with consideration of certain types of man's economic activities, e.g., agriculture, mining, construction, forest amelioration. For each type of activity the anthropogenic processes (e.g., creation of artificial water bodies, formation of waste dumps, grading of the earth's surface, creation of field-protecting forest plantings) and postanthropogenic processes and phenomena (e.g., reworking of shores and bottom of reservoirs and ponds, subsidence of the surface above mines, formation of anthropogenic deposits or cultural layer, decrease of the activity

of deflation and erosion processes and dust storms) are described.--Copyright 1976, Biological Abstracts, Inc.
W77-01039

GENERAL RECORDS AND NEW MORPHOMETRIC DATA FOR AN ENVIRONMENTAL STUDY ON LAKE ISEO, (IN ITALIAN),
Padua Univ. (Italy). Instituto di Botanica e Fisiologia Vegetale.
P. Cordella.
Riv Idrobiol 12(2/3), p 97-105, 1973.

Descriptors: *Lakes, *Lake morphology, Europe, Data collections, Discharge(Water), Distribution.
Identifiers: *Lake Iseo(Italy).

Geographical, morphological and hydrological data and references on the basic on Lake Iseo are reported. The morphological parameters were drawn from a bathymetric map recently issued by Istituto Idrografico della Marina (1967). Information on catchment area and discharge rates are also given. Hypsographic curves showing the depth-distribution of lake volume and areas are also presented.--Copyright 1976, Biological Abstracts, Inc.
W77-01041

2I. Water In Plants

THE INVASION OF RATE OF FISH YEARLINGS WITH PLEROCERCOIDS OF THE BROAD FISH TAPEWORM IN THE KAMA WATER RESERVOIR, (IN RUSSIAN),
All-Union Scientific Research Inst. of Medical Parasitology and Tropical Diseases, Moscow (USSR).
A. S. Artamoshin.
Med Parazitol Parazit Bolezn. 44(1), p 71-74, 1975.

Descriptors: Fish, *Perch, Reservoirs, Infection, *Fish diseases, *Fish parasites.
Identifiers: Diphyllobothrium-Latum, Kama Reservoir, Perca-Fluviatilis, *Plerocercoids, Russian-SFSR, *Tapeworm, USSR.

The infection rate with plerocercoids of Diphyllobothrium latum in 1-yr-old fish, mainly perch (Perca fluviatilis), was investigated in the Kama water reservoir in the Usolsk region of the Perm oblast, Russian SFSR, USSR, in 1971-1972. Considerable differences in the risk of fish infection were found in various parts of the water reservoir differing ecologically and by the extent of contamination with D. latum eggs. The level of fish infestation depended upon the period of their examination.--Copyright 1975, Biological Abstracts, Inc.
W77-00541

POLLUTION ECOLOGY OF FRESHWATER INVERTEBRATES,
389 p. Academic Press: New York, N. Y., London, England. 1974. Pr.$24.50. C. W. Hart, Jr., L. H. Samuel Fuller, (Eds.).

Descriptors: *Invertebrates, *Ecology, Protozoa, *Bioindicators, *Methodology, Crustaceans, Insects, Mollusks, Worms, Snails, Crayfish, Annelids, Clams, Publications.
Identifiers: Bryozoa, *Flatworms, *Pollution ecology, Leeches, Sponges.

Each article in this volume deals with 1 of the major invertebrate groups. The normal ecology, recent systematic interpretations and current knowledge on pollution ecology are the major areas of discussion for each invertebrate group. The protozoans, sponges, flatworms, leeches, aquatic earthworms, bryozoans, crayfishes, clams, mussels, insects and snails are dealt with. The methodology and limitations of using these invertebrates as pollution indicators are discussed. Each paper concludes with a reference list which serves as a source for supplementary background material. Environmentalists, biologists and research workers and students in this field will find this book valuable as a reference source.--Copyright 1975, Biological Abstracts, Inc.
W77-00557

EFFECT OF YEAST AND COBALT CHLORIDE IN INCREASING SURVIVAL RATE OF HATCHLINGS OF HETEROPNEUSTES FOSSILS (BLOCH),
Central Inland Fisheries Research Inst., Jaipur (India). All-India Co-ordinated Research Project.
H. A. Khan, and S. K. Mukhopadhyay.
Indian J Anim Sci. 43(6), p 540-542, 1973.

Descriptors: *Yeasts, *Chlorides, Fish food organisms, Fish hatcheries, Plankton, Mortality.
Identifiers: *Cyclops, *Heteropneustes-Fossilis, *Cobalt chloride.

The survival of hatchlings of H. fossilis (Bloch) is very poor, especially in the 1st 2 wk. This may be because of shortage of choice food, depradation by Cyclops and cannibalism. While feeding the fish with live plankton, an application of yeast (0.05 g/l) and cobalt chloride (1 ppm) in the water enhance the survival rate of the hatchlings up to 80%. The experimental procedure for this is discussed in detail.--Copyright 1975, Biological Abstracts, Inc.
W77-00632

CROWN STRUCTURE AND DISTRIBUTION OF BIOMASS IN A LODGEPOLE PINE STAND,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
H. L. Gary.
USDA For. Serv. Res. Pap. RM-165, (1975), 20 p.

Descriptors: *Biomass, *Canopy, Productivity, Transpiration, Pinus contorta, *Pine trees, *Trees, Foliar, *Plant growth.

Gross dimensions and quantities of needles and branches are presented for 298 trees. Weight, diameter, length, and height relations were usually highly correlated. Needles were normally distributed along the length of branches as well as vertically through the canopy. Needle and branchwood weights for entire crowns were best estimated by the logarithmic transformation of diameters at breast height. (Forest Service)
W77-00729

CHARACTERISTICS OF THE MAIN COMPONENTS OF WATER BALANCE OF SANDY DESERT PLANT COMMUNITIES, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Biogeography.
V. P. Dedkov, P. D. Gunin, and M. Ishankuliev.
Probl Osvoeniya Pustyn 2, p 21-27, 1975.

Descriptors: *Water balance, *Desert plants, Sands, Vegetation, Distribution, Rainfall, Moisture content.
Identifiers: Ammodendron-conollyi, Calligonum-arborencens, Carex-physodes, Haloxylon-ammodendron, Haloxylon-persicum, Kara-kum, *Turkmen-SSR(USSR).

Data are presented on the effect that tree and shrub vegetation has on the redistribution of rainfall, dynamics of field moisture and plant water discharge. Comparison of the total reserve, water discharge 2 m deep and plant water discharge shows that the water balance in the association of Ammodendron conollyi - Calligonum arborescens in barkhan sands is positive, in the Haloxylon ammodendron - Carex physodes association in valley-like depressions it is negative and in H. persicum-C. physodes it is balances (Turkmen SSR, USSR).--Copyright 1976, Biological Abstracts, Inc.
W77-00882

THE HEAT BALANCE IN THE FOREST-STEPPE MESOPHILIC DECIDUOUS HIGH OAK FOREST 'LES NA VORSKLE' UNDER ABNORMAL WEATHER CONDITIONS, (IN RUSSIAN),
Leningrad State Univ. (USSR).
A. I. Karausheva.
Vestn Leningr Univ Biol 2, p 68-76, 1975.

Descriptors: *Heat balance, *Oak trees, *Forest management, Humidity, Deciduous trees, Weather.
Identifiers: Acer-campestre, Acer-platanoides, Fraxinus-excelsior, Quercus-robur, Steppe, Tiliacordata, *USSR, Vorskle.

Heat balance in the oakwood (USSR) was investigated under extreme weather conditions in the dry, hot, cloudless summer of 1972 and in the cloudy, wet summer with heavy rains in 1973. The vertical humidity, heat exchange and temperature profile were analyzed in biohorizons in the tree crowns (Quercus robur, Tilia cordata, Acer campestre, A. platanoides, Fraxinus excelsior) and under them. Characteristics of the investigated plot and methods of observation and calculation are discussed.--Copyright 1976, Biological Abstracts, Inc.
W77-00964

2J. Erosion and Sedimentation

URBAN SEDIMENT PROBLEMS: A STATEMENT ON SCOPE, RESEARCH, LEGISLATION, AND EDUCATION.
American Society of Civil Engineers, New York. Task Committee on Urban Sedimentation Problems.
For primary bibliographic entry see Field 5B.
W77-00556

ALIPHATIC HYDROCARBONS IN SEDIMENTS OF LAKE WASHINGTON,
Washington Univ., Seattle. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W77-00643

HYDROCHEMISTRY OF THE PARANA RIVER,
Instituto Nacional de Limnologia, Santo Tomo (Argentina).
For primary bibliographic entry see Field 2K.
W77-00644

STRATIFIED WATERS AS A KEY TO THE PAST,
Hamburg Univ. (West Germany). Geologisch-Palaontologisches Institut.
E. T. Degens, and P. Stoffers.
Nature, Vol. 263, No. 5572, p 22-27, September 2, 1976. 6 fig, 34 ref.

Descriptors: *Stratification, *Sediments, *Lakes, *Oceans, Thermal stratification, Facies(Sedimentary), Geologic time, *Geologic history, Paleolimnology, Paleoclimatology, *Density stratification, Chemicals, Oxygen, Diatoms, Sedimentology, *Lake sediments.

Density stratification in lakes and oceans generate anoxic conditions below the pycnocline, and sediment facies mirror this development. A comparison of modern sediments deposited in stratified and non-stratified waters with sediments formed since the Cambrian revealed that the ancient sea has been stratified a number of times. (Sims-ISWS)
W77-00659

SEDIMENT CHARACTERISTICS AND THE TROPHIC STATUS OF FOUR OREGON LAKES,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5B.
W77-00673

INTEGRAL-EQUATION ANALYSIS OF FLOWS OVER ERODING BEDS,
Mississippi Univ., University. Dept. of Civil Engineering.
S. N. Prasad, and C. V. Alonso.
In: Proceedings, ASCE Symposium on Inland Waterways for Navigation, Flood Control and Water Diversions, Aug. 10-12, 1976, Colorado State University, Fort Collins, CO, Vol. I, p 760-772, 5 fig, 7 ref.

Descriptors: *Stream erosion, *Bank erosion, *Sediment transport, *Tractive forces, Fluid mechanics, Hydraulics, Natural streams, Steady flow, Uniform flow, Viscous flow, Analytical techniques, Open channel flow.
Identifiers: *Fredholm integral equation, Rectangular channels.

The steady uniform flow in alluvial channel of rectangular cross section with a partially eroding bed is considered. The wetted perimeter is divided into an inner region in which the known critical tractive forces are exceeded, surrounded by a region where the fluid velocity is known to vanish. The free surface is free from shear. This mixed boundary value problem is formulated in terms of a dual series which leads to the solution of a Fredholm integral equation of the second kind. This solution determines the extent of the eroding zone and the distribution of the bed-slip velocity. Particular solutions that include the distribution of isotachs and boundary unit tractive forces are presented for the case of incipient erosion at the bed center, and for the case of a fully eroding bed. Numerical results of the quantities of practical interest are reported. (ARS)
W77-00682

THE SEDIMENTS OF LAKE GEORGE (UGANDA). I: REDOX POTENTIALS, OXYGEN CONSUMPTION AND CARBON DIOXIDE OUTPUT,
Malaya Univ., Kuala Lumpur (Malaysia). School of Biological Sciences.
For primary bibliographic entry see Field 5C.
W77-00712

THE ROLE OF SEDIMENT AS A MODIFYING FACTOR IN PESTICIDE-ALGAE INTERACTIONS,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W77-00713

SUBMERGED BURLAP STRIPS AIDED REHABILITATION OF DISTURBED SEMIARID SITES IN COLORADO AND NEW MEXICO,
Forest Service (USDA), Tempe, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W77-00727

MOUNTAIN WATERSHEDS AND DYNAMIC EQUILIBRIUM,
Forest Service (USDA), Tempe, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W77-00728

PROCEEDINGS OF THE THIRD FEDERAL INTER-AGENCY SEDIMENTATION CONFERENCE 1976.
Water Resources Council, Washington, D.C. Sedimentation Committee.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 100, Price codes: A99 in paper copy, A01 in microfiche. Report SEDCOM-03, Preprints for a conference held March 22-25, 1976, Denver, Colorado. Sedimentation Committee of the Water Resource Council, Washington, D.C., December 1975. 974 p.

Descriptors: *Sedimentation, *Sediment transport, *Erosion, *Surface runoff, *Conferences, Sediment control, Erosion control, Sediments, Deposition(Sediments), Suspended solids, Rivers, Streams, Coasts, Estuaries, Watersheds(Basins), Forests, Channel improvement, Urban runoff, Physical properties, Chemical properties, Instrumentation, Equipment, Sedimentology.

In the 13 years since the last conference, there has been a large amount of research and development work. The work group recommended that a third conference be held in March 1976. Of the 130 workers in sedimentation who indicated a willingness to prepare and present papers at this Third Federal Inter-Agency Conference on Sedimentation, the committee accepted about 80 papers for publication in the proceedings. The broad topics covered were the following: Sediment yield and sources; Erosion and sediment control; Physical and chemical properties of sediment; Sediment transport and deposition; Channel adjustments; Coastal zone sedimentation; and Instrumentation. (See W77-00776 thru W77-00845) (Sims-ISWS)
W77-00775

EROSION POTENTIAL OF SOILS,
Soil Conservation Service, Washington, D.C. Soil Survey Interpretations Div.
K. K. Young.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-1 - 1-10, 1976. 12 ref.

Descriptors: *Erosion, *Soil erosion, *Farm management, *Urbanization, Farms, Cities, Environment, Land use, Soils, Soil surveys, Soil texture, Organic matter, Soil structure, Soil conservation, Permeability, Crops, Structures.
Identifiers: *Erosion potential, Soil loss equation, Soil erodibility factor.

Erosion and sediment from farmland remains a serious problem in the United States. Gaining national concern is the erosion and sediment resulting from urban development. Predicting the erosion potential of soils is one of the first steps used by the Soil Conservation Service in planning conservation systems that control soil erosion on farmland and urban developments alike. This paper described the application of research to produce a practical field procedure for determining the erosion potential of soils. Special emphasis was given to the soil factors that influence erosion and to how soil surveys are used to predict the areas of potential erosion. (See also W77-00775) (Sims-ISWS)
W77-00776

EFFECT OF LAND USE ON SEDIMENT DELIVERY RATIOS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
C. K. Mutchler, and A. J. Bowie.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-11 - 1-21, 1976. 4 fig, 2 tab, 8 ref.

Descriptors: *Erosion, *Land use, *Sediments, *Mississippi, Gullies, Gully erosion, Watersheds(Basins), Rainfall, Runoff, Geomorphology, Soils, Mathematical studies, Soil erosion, Sediment yield, Sheet erosion, Drainage area, Crops, Farm management, Structures.
Identifiers: Erosion potential.

Data from two subwatersheds in the Pigeon Roost Creek Watershed in northern Mississippi were used to compute sediment delivery ratios for each year of a 15-year period. Land use changes resulted in greatly decreasing land and gully erosion estimates in one watershed and slightly increasing estimates for the other. Computed annual sediment delivery ratios did not seem to change due to changing land use on either watershed. However, annual values of delivery ratios changed directly with annual runoff. The major effect of gully plugs and other conservation structures on sediment production was to negate the effect of 33 and 34% of the total estimated sheet and gully erosion on the two watersheds. (See also W77-00775) (Sims-ISWS)
W77-00777

WATERSHED EROSION MODEL VALIDATION FOR SOUTHWEST IOWA,
Agricultural Research Service, Morris, Minn. North Central Soil Conservation Research Center.
For primary bibliographic entry see Field 4D.
W77-00778

RESERVOIR SEDIMENTATION ASSOCIATED WITH CATCHMENT ATTRIBUTES, LANDSLIDE POTENTIAL, GEOLOGIC FAULT, AND SOIL CHARACTERISTICS,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-35 - 1-46, 1976. 1 tab, 19 ref.

Descriptors: *Reservoirs, *Sedimentation, *Regression analysis, *California, Watersheds(Basins), Erosion, Precipitation(Atmospheric), Rainfall, Forests, Forest fires, Roads, Geology, Faults(Geologic), Soils, Streamflow, Landslides, Topography, Sedimentology.

Deposition measurements in 48 northern California reservoirs were found related to precipitation amount, rain-snow frequency, road standards and location, forest fires, geology, and physiography, and also to differences among watersheds (catchments) in landslide classes, extent of geologic faults, clay content of watershed soils, and density of reservoir sedimentation. The data were analyzed by reduced rank principal component techniques. The final regression equation had an explained variance of 0.86 and a standard error of 0.138 log units. Difference in average annual deposition associated with reservoir density was 39%; with landslides, 100%; with faults, 41%; and with clay in watershed soils, 32%. Some geologic rock types with geologic faults and high landslide potential had a predicted sediment rate as much as 17 times that of areas without faults. Roads located near streams contributed the most to deposition-- twice as much as did roads located elsewhere, and improved secondary roads near streams were the single greatest contributor, especially in areas of steep terrain. Roads in steep topography produced twice as much acceleration in sedimentation as did those in less steep terrain. Preliminary appraisal of bedload (difference between reservoir deposition and suspended sediment discharge) indicated that it varies from 90% to less than 20% of 'total load' in different areas. (See also W77-00775) (Sims-ISWS)
W77-00779

SEDIMENT YIELD FROM CONSTRUCTION SITES,
MITRE Corp., McLean, Va. Dept. of Environmental Assessment.
For primary bibliographic entry see Field 4C.
W77-00780

SEDIMENT SOURCES AND YIELDS FROM SAGEBRUSH RANGELAND WATERSHEDS,
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
For primary bibliographic entry see Field 4D.
W77-00781

EROSION AND SEDIMENT YIELD IN NEW MEXICO,
Soil Conservation Service, Portland, Oreg. Engineering and Watershed Planning Unit.
N. M. Curtis, Jr.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-81 - 1-90, 1976. 4 fig, 6 tab, 7 ref.

Descriptors: *Erosion, *Sediment yield, *New Mexico, Land use, Ranges, Forests, Crops, Cities, Rainfall, Runoff, Precipitation(Atmospheric), Sediments, Sedimentation, Soil erosion, Watersheds(Basins), Rivers, Vegetation, Gullies, Sedimentology, Sheet erosion.

Annual erosion in New Mexico was estimated to be between 50 and 119 million cubic meters (40,900 and 96,500 acre-feet). An estimated 74% of the erosion occurred on rangeland with lesser percentages on forest, urban, and crop land. It was found that erosion in localized areas can be more than 15,242 cubic meters per square kilometer per year (32 acre-feet per square mile per year). It was also learned that average annual sediment yield to reservoirs may be more than 4,334 cubic meters per square kilometer per year (9.1 acre-feet per square mile per year). Suspended sediment concentrations have been as high as 267,000 milligrams per liter in the Rio Pureco. (See also W77-00775) (Sims-ISWS)
W77-00782

DEBRIS FLOWS FOLLOWING WILDFIRE IN NORTH CENTRAL WASHINGTON,
Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W77-00783

SEDIMENT YIELDS FROM A MISSISSIPPI DELTA WATERSHED,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 4D.
W77-00784

SEDIMENTATION IN BIRCH LAKE, IOWA COUNTY, WISCONSIN,
Soil Conservation Service, Madison, Wis.
R. N. Cheetham, Jr., and R. F. Wilke.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-110 - 1-122, 1976. 3 fig, 3 tab, 11 ref.

Descriptors: *Sedimentation rates, *Lake sediments, *Reservoirs, *Wisconsin, Surveys, Sampling, Chemical properties, Physical properties, Sediments, Bottom sediments, Sedimentation, Storage capacity, Land use, Soils, Geology, Drainage, Sediment yield, Erosion, Soil erosion, Sedimentology.
Identifiers: *Birch Lake(Wis), *Trout Creek(Wis), Iowa County(Wis).

During March 1975, a reservoir sediment survey was made at Birch Lake, Iowa County, Wisconsin. Twenty-three bottom sediment samples were collected through the ice along eight ranges in the lake. Two ranges were augered on the flood plain of Trout Creek above the impoundment. The samples were first described in the field, and then selected portions of core profiles were analyzed for physical and chemical properties. The volume and density of a 10.5-year accumulation of sediment in the reservoir were determined. The sediment survey indicated an average annual sediment yield in 10.5 years of 3.45 metric tons/ha (1.54 tons/acre) as compared with a predicted average annual yield of 1.88 metric tons/ha (0.84 tons/acre) in 1960 prior to dam construction and 1.59 metric tons/ha (0.71 tons/acre) in 1974. The watershed was predominantly cropland and pasture. Land use and land treatment were compared prior to dam construction and in 1974. Comparisons were made between predicted watershed sediment yield and the measured sediment in the reservoir. This study is a basis for future land use, land treatment, and sediment surveys at 5-year intervals. (See also W77-00775) (Sims-ISWS)
W77-00785

SEDIMENT YIELD FROM STEEP LANDS IN THE DRIFTLESS AREA,
North Central Forest Experiment Station, La Crosse, Wis. Watershed Lab.
R. S. Sartz.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-123 - 1-131, 1976. 4 fig, 4 tab, 8 ref.

Descriptors: *Sediment yield, *Suspended solids, *Erosion, *Wisconsin, Forests, Cultivated lands, Pastures, Grazing, Surveys, Sampling, Data processing, Watersheds(Basins), Storms, Runoff, Storm runoff, Gullies, Soil erosion, Sediments, Sediment discharge.

Data from four years of experimentation were summarized: Suspended sediment in runoff water was measured on natural runoff plots and small watersheds in different land uses on southwestern Wisconsin's ridge and valley lands. Substantial amounts of sediment were discharged only from cultivated or heavily grazed catchments. The greatest amounts--sometimes exceeding 200,000 ppm--came from tilled cropland in early stages of crop development. Values varied greatly from one catchment to another, probably because of differences in erosion patterns that developed under tillage and because of differences in cover density. Some additional observations were made on sediment movement: Ungrazed forest and prairie in the Driftless Area yield no significant amounts of runoff or sediment, regardless of slope steepness, unless they intercept water from overlying fields. However, field runoff can carve huge gullies on forested slopes that lie below cultivated uplands. Thus, the forested slopes of the area have been a major sediment source from gully erosion since the time of agricultural settlement. (See also W77-00775) (Sims-ISWS)
W77-00786

EROSION AND SEDIMENT FROM FOREST LAND USES, MANAGEMENT PRACTICES AND DISTURBANCES IN THE SOUTHEASTERN UNITED STATES,
Forest Service (USDA), Atlanta, Ga. Southeastern Area.
For primary bibliographic entry see Field 4C.
W77-00787

SIMULATING EROSION DYNAMICS WITH A DETERMINISTIC DISTRIBUTED WATERSHED MODEL,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 4D.
W77-00788

SEDIMENTATION OF A FLATLAND WATERSHED IN LOUISIANA,
Soil Conservation Service, Alexandria, La. Watershed Planning and River Basin Studies.
For primary bibliographic entry see Field 4D.
W77-00789

WATER AND SEDIMENT ROUTING FROM SMALL WATERSHEDS,
Colorado State Univ., Fort Collins, Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W77-00790

SOURCES AND SEDIMENT YIELD OF HAWAIIAN WATERSHED AND COASTAL SEDIMENTS,
Hawaii Univ., Honolulu. Dept. of Geology and Geophysics; and Hawaii Inst. of Geophysics.
P-F. Fan.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-219 - 1-231, 1976. 6 fig, 11 ref. OWRT A-043-HI(4).

Descriptors: *Sediment yield, *Watersheds(Basins), *Hawaii, *Mineralogy, Surveys, Sampling, Runoff, Rainfall, Sediments, Clays, Silts, Sands, Soils, Erosion, Geology, Vegetation, Slopes, Clay minerals, Coasts, Estuaries.

The mineral composition, as well as the texture of Hawaiian watershed and coastal sediments, are dependent on various parameters. Geology, climatology, vegetation, stream slope and channel morphology, bathymetry, and cultural activities, are all important. Hawaiian streams enter the ocean basin through one of the following kinds of environment: estuaries, bays, lagoons, or mouths of tidal streams. The coastal environments serve as temporary sinks for tidal streams. The coastal environments serve as temporary sinks for the sediments. Four representative watershed coastal environments from Oahu were selected for detailed study. They were Kahana, Kaneohe, Hawaii Kai, and Pearl Harbor. Kahana stream had the lowest sediment yield, compared with the stream in the urbanizing area. Kipapa Stream (Pearl Harbor Basin) had the highest sediment yield. (See also W77-00775) (Sims-ISWS)
W77-00791

THE HYDROLOGIC AND SEDIMENT PROCESSES IN NATURAL WATERSHED AREAS,
Hydrocomp International, Palo Alto, Calif.; and Hydrocomp International, Glasgow (Scotland).
For primary bibliographic entry see Field 4D.
W77-00792

SOIL EROSION CONCEPTS AND MISCONCEPTIONS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
L. D. Meyer, D. G. DeCoursey, and M. J. M. Romkens.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation committee, p 2-1 - 2-12, 1976. 2 fig, 1 tab, 29 ref.

Descriptors: *Soil erosion, *Sedimentation, *Erosion, Sheet erosion, Rill erosion, Sediments, Sediment transport, Rainfall, Runoff, Erosion control, Forecasting, Soils, Topography, Slopes, Sediment discharge, Sediment yield, Model studies, Mathematical models, On-site investigations.
Identifiers: *Erosion processes, Interrill erosion.

The complementary processes of soil erosion and sedimentation involve a complex interrelationship of many factors that influence detachment, transportation, and deposition of soil particles. Recent research has provided knowledge useful for developing improved concepts concerning these processes and for allaying certain misconceptions about them. In this paper, current concepts of the process of soil erosion by water were presented. Their implications as a basis for continued improvements in erosion prediction and control were discussed. Research deficiencies were indicated, and promising new approaches were explored. (See also W77-00775) (Sims-ISWS)
W77-00793

COMPARATIVE COSTS OF EROSION AND SEDIMENTATION CONTROL MEASURES,
Irrigation/Agriculture Engineering-Science, Inc., Berkeley, Calif.
For primary bibliographic entry see Field 4D.
W77-00794

SOIL RIPPING TREATMENTS FOR RUNOFF AND EROSION CONTROL,
Forest Service (USDA), Albuquerque, N. M. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W77-00795

SOIL AND WATER LOSS FROM IMPOUNDMENT TERRACE SYSTEMS,
Agricultural Research Service, Ames, Iowa.
For primary bibliographic entry see Field 4D.
W77-00796

EXCAVATED SEDIMENT TRAPS PROVE SUPERIOR TO DAMMED ONES,
Forest Service (USDA), Rolla, Mo. National Forests in Missouri.
For primary bibliographic entry see Field 4D.
W77-00797

EROSION AND SEDIMENT CONTROL ON RESHAPED LAND,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 4D.
W77-00798

DEFINING THE SEDIMENT TRAPPING CHARACTERISTICS OF A VEGETATIVE BUFFER. SPECIAL CASE: ROAD EROSION,
Forest Service, Denver, Colo. Rocky Mountain Region.
For primary bibliographic entry see Field 4D.
W77-00799

GEOTECHNICAL MANAGEMENT OF FOREST LANDS IN GRANITIC TERRANE,
Forest Service (USDA), Medford, Oreg. Rogue River National Forest.
For primary bibliographic entry see Field 4C.
W77-00800

EVALUATION OF AN EXTENSIVE SEDIMENT CONTROL EFFORT IN THE LOS ANGELES RIVER BASIN,
Forest Service (USDA), Turlock, Calif. Stanislaus National Forest.
For primary bibliographic entry see Field 4D.
W77-00801

SEDIMENT CONTROL AT IMPERIAL DAM,
Bureau of Reclamation, Yuma, Ariz. Yuma Projects Office.
For primary bibliographic entry see Field 4D.
W77-00802

DETERMINING EROSION FROM HAWAIIAN AGRICULTURAL LANDS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 4D.
W77-00803

THE UNIVERSAL SOIL LOSS EQUATION AS ADAPTED TO THE PACIFIC NORTHWEST,
Washington State Univ., Pullman. Agricultural Research Center.
D. K. McCool, R. I. Papendick, and F. L. Brooks.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 2-135 - 2-147, 1976. 4 fig, 1 tab, 15 ref.

Descriptors: *Soil erosion, *Pacific Northwest U. S., *Agricultural runoff, Equations, Regression analysis, Temperature, Topography, Soils, Slopes, Crops, Adaptation, Farm management, Erosion, Sediments, Rainfall, Runoff.
Identifiers: Universal Soil Loss Equation.

Use of the Universal Soil Loss Equation for soil loss prediction in the Pacific Northwest has been limited by inapplicable relationships for the factors of the equation. A first-generation adaptation of the equation was made by developing new relationships to fit Pacific Northwest conditions. These included (1) a slope length-steepness relationship to account for steeper slopes (greater than 20%) and runoff-induced erosion; (2) a runoff-rainfall erosion factor that accounts for effects on soil loss of climatic phenomena peculiar to the region, i.e., low intensity rainfall, snowmelt, and rain or snowmelt on frozen ground; and (3) first-approximation crop management factors to fit the region. The Soil Conservation Service is field testing the adaptation. (See also W77-00775) (Sims-ISWS)
W77-00804

TECHNIQUES OF RESEARCHING INFORMATION FOR THE DEVELOPMENT OF A MANUAL TO VEGETATE SOILS OF LOW PRODUCTIVITY DISTURBED BY CONSTRUCTION ACTIVITIES,
Midwest Research Inst. Kansas City, Mo.
For primary bibliographic entry see Field 4D.
W77-00805

THE DILEMMAS OF SETTING SEDIMENT STANDARDS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W77-00806

DESIGN AND PERFORMANCE OF ROCK REVETMENT TOES,
Army Engineer District, Kansas City, Mo. Hydrologic Engineering Branch.
For primary bibliographic entry see Field 8D.
W77-00807

CONTROL OF TURBIDITY AT CONSTRUCTION SITES,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 4D.
W77-00808

SUSPENDED SEDIMENT, SOLAR RADIATION AND HEAT IN AGRICULTURAL RESERVOIRS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
F. R. Schiebe, J. C. Ritchie, and J. R. McHenry.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 3-1 - 3-12, 1976. 5 fig, 2 tab, 4 ref.

Descriptors: *Sediments, *Solar radiation, *Water temperature, *Reservoirs, *Mississippi, Heat budget, Energy budget, Temperature, Reflectance, Heat transfer, Lakes, Equations, Secchi disks, Suspended solids, Albedo, Air-water interfaces, Radiation, Meteorology.

Comparative studies conducted on two adjacent northern Mississippi reservoirs showed that the suspended sediment has a measurable effect on the surface water temperature. Spectroradiometer measurements of reflected solar radiation from waters with different concentrations of suspended sediment indicated that up to 4 times as much energy is reflected from a reservoir with 200-ppm sediment concentrations than is radiated from an adjacent reservoir with 50-ppm concentrations. Epilimnion temperature measurements indicated a 1 to 4 C difference with clearer waters always warmer. Energy budget equations consistent with the experimental findings showed that if turbid waters reflect more energy, then the temperature of these surface waters is cooler than that of clear water. (See also W77-00775) (Sims-ISWS)
W77-00809

NUTRIENTS LOST IN DEBRIS AND RUNOFF WATER FROM A BURNED CHAPARRAL WATERSHED,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W77-00810

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SEDIMENTS ORIGINATING FROM MISSOURI VALLEY LOESS,
Agricultural Research Service, Cheyenne, Wyo. North Central Region.
For primary bibliographic entry see Field 5B.
W77-00811

SEDIMENT-PHOSPHORUS RELATIONS IN SURFACE RUNOFF FROM IRRIGATED LANDS,
Agricultural Research Service, Kimberly, Idaho. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 5B.
W77-00812

PESTICIDE CONCENTRATIONS AND YIELDS IN RUNOFF AND SEDIMENT FROM A MISSISSIPPI DELTA WATERSHED,
Agricultural Research Service, Baton Rouge, La.
For primary bibliographic entry see Field 5B.
W77-00813

EFFECT OF AN ARTIFICIALLY INCREASED SAND BEDLOAD ON STREAM MORPHOLOGY AND ITS IMPLICATIONS ON FISH HABITAT,
North Central Forest Experiment Station, Rhinelander, Wis. Inst. of Forest Genetics.
E. A. Hansen, and G. R. Alexander.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 3-65 - 3-76, 1976. 6 fig, 3 tab, 3 ref.

Descriptors: *Sands, *Bed load, *Sediments, *Michigan, *Habitats, Fish, *Trout, Brook trout, Fish populations, Habitat improvement, Scour, Channel morphology, Streams, Water temperature, Depth, Sand waves, Streambeds, Water pollution effects.
Identifiers: Added sands, Increased sand bedloads.

Sand sediment was added daily for nearly four years to a low gradient Michigan trout stream to

determine effects on stream morphology, water temperature, and, ultimately, the trout population. Daily sand input was adjusted so that the average sediment concentration was increased by a factor of four over the pretreatment concentration of 20 mg/l. Sediment discharge was measured just upstream of the sand input point, and also at the lower end of the treated section, 1.6 km (1 mile) downstream. Permanent stream cross-section stations were spaced at 30-m (100 ft) intervals along the 1.6 km (1 mile) control and treated sections to facilitate the measurement of channel changes. The trout population was inventoried twice a year to determine its response to the increased sand bedload. The added sand with its resultant streambed aggradation produced increases in stream gradient and width, and decreases in stream depth and in the total static volume of water. The stream gradient and channel form were more uniform throughout the treated reach due to pool filling. Streambed composition changed substantially; gravel areas decreased, sand areas increased. Water temperatures were slightly warmer in summer cooler in winter due, presumably, to the wider, shallower stream. The impact of these changes on the trout population will be reported at a later date to allow time for population responses, if any, to occur. (See also W77-00775) (Sims-ISWS)
W77-00814

ROLE OF THE SEDIMENTATION IN THE SELF-PURIFICATION OF THE SCHELDT ESTUARY,
Laboratoire de Recherches Hydrauliques, Antwerp (Belgium).
For primary bibliographic entry see Field 5B.
W77-00815

MODEL STUDY OF THE DRAG COEFFICIENT OF A STREAMBED PARTICLE,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
N. L. Coleman, and W. M. Ellis.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 4-1 - 4-11, 1976. 5 fig, 9 ref.

Descriptors: *Model studies, *Streambeds, *Sediment transport, *Hydraulic models, Mathematical models, Laboratory tests, Flow, Drag, Reynolds number, Loads(Forces), Sands, Equations, Silts, Sediments, Sedimentation.
Identifiers: *Time-mean drag coefficient.

A time-mean drag coefficient for a streambed particle was derived from considerations of flow-generated force moments and particle packing geometry. The drag coefficient was taken as a function of a particle Reynolds number and a velocity profile steepness parameter. These parameters were shown to be in fixed relation to each other because of the nature of the bounded shear flow near a streambed. The relation between these two parameters and the correlation of the drag coefficient with the relation between them was demonstrated in experiments. (See also W77-00775) (Sims-ISWS)
W77-00816

SEDIMENT TRANSPORT CHARACTERISTICS OF THE UPPER SAN FRANCISCO BAY-DELTA ESTUARY,
Bureau of Reclamation, Sacramento, Calif. Mid-Pacific Regional Office .
For primary bibliographic entry see Field 2L.
W77-00817

DIGITAL SIMULATION OF AGGRADATION AND DEGRADATION IN NATURAL STREAMS,
New South Wales Univ., Kensington (Australia). Faculty of Military Studies.
A. C. Amar, and W. A. Thomas.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 4-26 - 4-36, 1976. 5 fig, 4 ref.

Descriptors: *Scour, *Deposition(Sediments), *Model studies, Degradation(Stream), Aggradation, Sediment transport, Sediments, Streams, Rivers, Floodways, Levees, Mathematical models, Computer models, Channel morphology, Erosion, Sedimentation, Sedimentology, *Louisiana.
Identifiers: *Atchafalaya Floodway(La).

The analysis of scour and deposition by modeling the interaction between the water-sediment mixture, sediment material forming the stream's boundary, and the hydraulic characteristics of flow was presented using the Hydrologic Engineering Center's computer program entitled 'Scour and Deposition in Rivers and Reservoirs.' This simulation program was particularly useful for analyzing the impact of changes in energy gradient, channel width, inflowing sediment load, or bed material grain size on future trends in channel aggradation or degradation. The results of the analysis were useful for estimating the impact of aggradation on the design profile for levees and the amount, frequency, and location of maintenance dredging, as well as the effect of alternative measures, for maintaining a channel. Example applications illustrated the model calibration and demonstrated its applicability and usefulness for a wide range of hydraulic and sediment conditions. (See also W77-00775) (Sims-ISWS)
W77-00818

LAKE POWELL SEDIMENTATION SURVEYS,
Bureau of Reclamation, Salt Lake City, Utah. Div. of Planning.
J. F. Lazenby, and L. Nelson.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 4-52 - 4-63, 1976. 5 fig, 2 ref.

Descriptors: *Sedimentation, *Reservoirs, *Surveys, *Colorado River, Sedimentation rates, Deposition(Sediments), Reservoir silting, Sediments, Sediment distribution, Lakes, Dams, Rivers, Geomorphology, Deltas, Sedimentology.
Identifiers: *Lake Powell(Ariz-Utah), *Glen Canyon Dam.

Glen Canyon Dam, major unit of the Colorado River Storage Project, is located on the Colorado River near the Arizona-Utah border. Storage in the 27,000,000 acre-foot reservoir began in 1963. Preconstruction studies indicated that sediment would accumulate at an average rate of 85,400 acre-feet per year over a 100 year period. In 1968, 1970, and 1973 the Bureau of Reclamation conducted limited, reconnaissance grade surveys in the delta areas of the reservoir in order to monitor the sediment build-up and its relationship to recreational uses on the lake. Deltas in the two major tributary arms of the reservoir were found to be developing approximately as expected, with their configuration, at this early stage in the reservoir's life, strongly influenced by the original channel topography and the rising water surface. Relatively large delta build-ups have been noted in some of the smaller tributary canyons. Experience and data gained during these limited surveys will be put to use in laying out a monumented sediment range network when the time comes for the first complete volumetric survey of the reservoir. Baseline data for the volumetric survey will come from existing large scale, small contour interval topographic maps of the reservoir basin. (See also W77-00775) (Sims-ISWS)
W77-00819

SEDIMENT PROBLEMS IN THE MOHAVE VALLEY - A CASE HISTORY,
Bureau of Reclamation, Boulder City, Nev. Region 3; and Bureau of Reclamation, Boulder City, Nev. River Development Branch.
For primary bibliographic entry see Field 4D.
W77-00820

ON SEDIMENT TRANSPORT THROUGH THE GRAND CANYON,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
E. M. Laursen, S. Ince, and J. Pollack.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 4-76 - 4-87, 1976. 4 fig, 5 tab, 2 ref.

Descriptors: *Sediment transport, *Colorado River, *Beaches, *Sand bars, Sediment load, Particle size, Degradation, Erosion, Deposition(Sediments), Sands, Beach erosion, Eddies, Banks, Bank erosion, Sediments, Sedimentation, Sedimentology, Arizona.
Identifiers: *Grand Canyon, *Glen Canyon Dam.

With the closure of the Colorado River by Glen Canyon Dam, both the amount and the nature of the sediment movement through the Grand Canyon have changed. At present, the mean annual capacity of the river to carry beach-building material is about 12 million metric tons per year. The tributaries supply about 2.7 metric tons of beach-building sediment per year. The difference of about 9 million metric tons per year must be obtained through scour of bed and/or banks. It is estimated that without remedial measures it may take somewhat more than 200 years before the beaches and sand bars between Glen Canyon Dam and Lake Mead disappear. (See also W77-00775) (Sims-ISWS)
W77-00821

SEDIMENT TRANSPORT STUDIES IN THE DELTA-MENDOTA CANAL AND THE CALIFORNIA AQUEDUCT,
Bureau of Reclamation, Sacramento, Calif. Mid-Pacific Regional Office.
For primary bibliographic entry see Field 2L.
W77-00822

THE SEDIMENTARY INFLUENCE OF A TRIBUTARY STREAM GROWTH OF THE NIOBRARA DELTA,
Army Engineer District, Omaha, Nebr.
R. H. Livesey.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 4-127 - 4-137, 1976. 5 fig, 5 tab.

Descriptors: *Deltas, *Sedimentation, *Rivers, *Missouri River, Deposition(Sediments), Channels, Channel morphology, Braiding, Flow, Streamflow, Flow control, Sand bars, Sediment yield, Sediment load, Sediment discharge, Sedimentology.
Identifiers: *Niobrara River(Neb).

There is evidence that a dynamic balance has been achieved between the sediment transport capabilities of two alluvial streams when graded conditions develop at their confluence. This quasi-equilibrium state implies a dual adjustability in the channel dimensions or slope of both streams as the individual hydrologic trends of the separate drainages vary discharges and sediment loads. When a sudden reduction in the frequency, magnitude, and duration of flows on the main stem occurs due to upstream regulation, this balance is interrupted and the tributary sediment contribution assumes controlling proportions. Such was the case at the mouth of the Niobrary River after the

Missouri River reservoir system commenced operation in 1953. This paper discussed the growth of the Niobrara delta in the Missouri River channel over a 20-year period. Preliminary results of study investigations were summarized and prevailing trends identified. (See also W77-00775) (Sims-ISWS)
W77-00824

DISTRIBUTION OF RESERVOIR SEDIMENT--IOWA AND MISSOURI DEEP LOESS HILLS,
Agricultural Research Service, Columbia, Mo. North Central Watershed Research Center.
H. G. Heinemann, and D. L. Rausch.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 4-138 - 4-148, 1976. 2 fig, 1 tab, 12 ref.

Descriptors: *Sediment distribution, *Reservoirs, *Iowa, *Missouri, Sedimentation, Storage capacity, Depth, Precipitation(Atmospheric), Runoff, Erosion, Equations, Spillways, Sediments, Loess, Soil erosion, Regression analysis, Sedimentology.

Sedimentation data from 58 surveys of 41 reservoirs were analyzed to determine sediment distribution of deposited sediment. All reservoirs, except two, were located in the Iowa and Missouri Deep Loess Hills Major Land Resource Area. The sedimentation information curves approach was used in this study. Linear and nonlinear regression analyses were used to develop prediction equations for various values of the capacity replaced by sediment curve. It was learned that the minimum design spillway elevation can be predicted if the following are known: (1) total capacity to be replaced by sediment at the end of the reservoir design life, (2) reservoir original 'N' value, (3) length, and (4) original depth. The percentage of the remaining capacity that lies below the principal spillway is dependent upon: (1) the remaining depth ratio, (2) the original 'N' value, and (3) the percentage of the total original capacity that was below the principal spillway. By having the capacity replaced by sediment curve and the original stage-capacity curve, points can be computed for drawing the sediment distribution curve. The capacity replaced by sediment curve and its corresponding sediment distribution curve can be predicted for any estimated reservoir storage depletion in the Iowa and Missouri Deep Loess Hills. (See also W77-00775) (Sims-ISWS)
W77-00825

THE ROLE OF SEDIMENT PROBLEMS IN HYDROELECTRIC DEVELOPMENT,
Federal Power Commission, Washington, D.C. Office of Energy Systems.
For primary bibliographic entry see Field 4D.
W77-00826

SCOUR AND FILL IN AN EPHEMERAL STREAM,
California Inst. of Tech., Pasadena. Div. of Geological and Planetary Sciences.
M. G. Foley.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 5-1 - 5-12, 1976. 6 fig, 1 tab, 17 ref. NSF GK 31802, Army DAHC04-74-G-0189.

Descriptors: *Scour, *Landfills, *Deposition(Sediments), *Ephemeral streams, Erosion, Sedimentation, Degradation(Stream), Aggradation, Beds, River beds, On-site investigations, Runoff, Floods, Equations, Flow, Streamflow, Sedimentology.

The classical concept that mean bed elevation over an entire stream reach is lowered by scour during flood-wave passage and is restored by deposition in the waning flood phase (mean-bed scour and fill) can be challenged. The alternative that both scour and fill occur simultaneously at different migrating loci within a reach (local scour and fill) is more consistent with published field data. The field investigation reported herein suggested that mean-bed scour and fill in a natural uniform channel is minor compared to local scour and fill caused by bedform migration. This experiment, utilizing a rectilinear array of buried maximum-scour indicators (scour-cords), produced data for contouring of maximum scour and fill in an ephemeral streambed during two floods. In the first flood, 24 cm (9.5 in) of scour and fill were measured for a bankfull flow depth of 23 cm (9 in). In the second flood, maximum scour and fill were at least 66 cm (26 in) for a bankfull flow depth of 34 cm (13 in). Estimates of antidune amplitudes for the two floods, based on theoretical models and laboratory and field observations, were 28 to 64 cm (11 to 25 in) and 48 to 97 cm (19 to 38 in), respectively. This suggests that all scour and fill measured by the scour-cord array was caused by antidune migration. (See also W77-00775) (Sims-ISWS)
W77-00827

CHARACTERISTICS OF STABLE NATURAL CHANNELS AND THEIR RELATION TO CHANNEL DESIGN,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 8B.
W77-00828

OBSERVED CHANNEL CHANGES IN A MOUNTAIN STREAM DUE TO INCREASED FLOW FROM TRANSBASIN IMPORTS,
Bureau of Reclamation, Denver, Colo. Flood Hydrology Section.
For primary bibliographic entry see Field 8B.
W77-00829

APPLICABILITY OF THE UNIT STREAM POWER EQUATION,
Army Engineer District, Chicago, Ill.
C. T. Yang, and J. B. Stall.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 5-37 - 5-47, 1976. 8 fig, 12 ref. OWRT B-075 - ILL(4). 14-31-0001-3881.

Descriptors: *Sediment transport, *Yield equations, *Sediment discharge, Rivers, Equations, Estimating equations, Sediments, Sediment yield, Flow, Streamflow, Velocity, On-site investigations, Suspended solids, Beds, Streambeds.
Identifiers: Unit stream power equation.

The usefulness of a sediment transport equation to engineering depends on its applicability to natural rivers. Data collected from six river stations were used to compare the applicability of different equations. The comparisons indicated that the dimensionless unit stream power equation is the one which can provide accurate predictions of total sediment discharge in natural rivers under diversified flow and sediment conditions. The limitations to which this dimensionless unit stream power equation can be applied were explained. (See also W77-00775) (Sims-ISWS)
W77-00830

ENTRENCHMENT OF DRAINAGE SYSTEMS IN WESTERN IOWA AND NORTHWESTERN MISSOURI,
Agricultural Research Service, Columbia, Mo.
R. F. Piest, C. E. Beer, and R. G. Spomer.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 5-48 - 5-60, 1976. 7 fig, 1 tab, 12 ref.

Descriptors: *Erosion, *Drainage systems, *Agricultural runoff, *Iowa, *Missouri, Gullies, Gully erosion, Channel morphology, Sediment yield, Channel erosion, Degradation(Stream), Erosion control, Crops, Soil erosion, Sheet erosion, Rill erosion, Sedimentation.
Identifiers: *Drainageway erosion.

During the past few decades, drainageway erosion in the loess hills region of Iowa and Missouri has accelerated, and there is little deterrent to continued erosion on a massive scale. It is complexly linked to the general runoff regimen and to changes in soil water content. Overland runoff volumes due to intensive cultivation are 2 to 3 times presettlement volumes, and peak flow rates average more than 10 times the presettlement norm that existed before 1850. The erosion problem was assessed from random channel measurements in three counties of the study region from intensive measurements of sheet-rill and gully erosion rates on experimental watersheds near Treynor, Iowa, and from existing sediment yield records. Although measures of sediment yields at downstream locations usually were less than 12 or 13 metric t/ha (5 or 6 t/a) per year, the total upland erosion (sometimes called gross erosion) was significantly greater. Intermediate-size channels draining areas of more than 2.6 sq km (1 sq mi) were degrading rapidly, with average losses of 4.5 metric t/ha (2 t/a) sediment annually; gully erosion rates for smaller drainage basins averaged at least 4.5 metric t/ha (2 t/a) each year; and the soil losses from sheet-rill erosion on fields averaged at least 18 metric t/ha (8 t/a) annually. (See also W77-00775) (Sims-ISWS)
W77-00831

CHANNEL CHANGES IN THE COLORADO RIVER BELOW GLEN CANYON DAM,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
E. L. Pemberton.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 5-61 - 5-73, 1976. 11 fig, 1 tab, 5 ref.

Descriptors: *Channel morphology, *Erosion, *Degradation(Stream), *Colorado River, Sampling, Surveys, On-site investigations, Particle size, Sands, Gravels, Rocks, Sediments, Bottom sediments, Channel erosion, Streamflow, Dams.
Identifiers: *Glen Canyon Dam, *Paria River, Armoring, Armoring layers.

Construction of Glen Canyon Dam on the Colorado River by the Bureau of Reclamation started in 1956, and the dam was officially closed in March 1963. The 1957 degradation study, based on a detailed bottom sediment sampling program in 1956 and an analytical approach to sediment transport and armor, resulted in a prediction of about a 1.22-meter (4-foot) degradation immediately below the dam and 8.26 million cubic meters (6,700 acre-feet) of erosion to take place in the reach above the mouth of the Paria River in about 14 years. To verify changes since closure of the dam, resurveys of cross sections in the approximate 24-kilometer (15-mile) reach of the Colorado River from Glen Canyon Dam to the mouth of the Paria River near Lees Ferry were made in 1959, 1963, 1965, and 1975. Bottom sediment samples were also collected in 1966 and 1975 to analyze the changes in material size as a result of the degradation and armoring process. The resurveys confirmed the 1957 predictive study by noting that sufficient armoring material remained to control excessive degradation with about 9.87 million cubic meters (8,000 acre-feet) of material scoured from the channel bottom by 1975. This paper summarized the 1957 predictive study of probable degradation and described the changes that have taken place in the channel from 1956 to 1975. (See also W77-00775) (Sims-ISWS)
W77-00832

CHANNEL CHANGES PRODUCED BY THE 1973 FLOOD ON THE LOWER MISSISSIPPI RIVER,
Army Engineer District, Vicksburg, Miss. Potamology Section.
W. H. Walters.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 5-74 - 5-85, 1976. 11 fig.

Descriptors: *Channel morphology, *Erosion, *Sedimentation, *Mississippi River, Deposition(Sediments), Floods, Turbulence, Flow, Sediments, Sands, Gravels, Sand bars, Aerial photography, On-site investigations, Flow characteristics, Flow profiles, Velocity, Islands, Dikes, Rivers.

The 1973 flood on the Lower Mississippi River offered a unique opportunity to observe the effects of a major flood on the morphology of the channel. A limited number of segments or reaches of river was chosen for a study of changes based on availability of previous hydrographic surveys and preflood color infrared photography. The Togo Island Bend to Middleground Island Reach was selected for discussion in this paper. Water surface flow patterns were identified using color infrared photography and surface float measurements in conjunction with hydrographic surveys. Field trips taken during the following low water season revealed definite changes in the shape and areal extent of both sand bars and islands. In most cases, the islands were larger and had increased in elevation to near the top bank height of the main channel. Gravel deposits were present to a greater extent than in previous years. The gravel sizes observed were much larger than could be sampled with the sediment sampling equipment now used. The effects of the 1973 flood clearly indicated that large floods accelerate changes in channel shape and alter the characteristics of the alluvial deposits. (See also W77-00775) (Sims-ISWS)
W77-00833

MODEL STUDY OF RIVERBED MATERIAL IN CANYON FERRY DAM SPILLWAY STILLING BASIN,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
P. H. Burgi.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 5-86 - 5-99, 1976. 5 fig, 1 tab.

Descriptors: *Dams, *Settling basins, *Deposition(Sediments), *Model studies, Hydraulic models, Spillways, Stream stabilization, Rivers, River beds, Reservoir releases, Reservoir operation, Sediments, Erosion, Sedimentology.
Identifiers: *Canyon Ferry Dam(Mont).

Hydraulic model studies were made to determine the cause and recommend a solution for the deposit and movement of riverbed material into the Canyon Ferry Dam spillway stilling basin. Tests indicated that movement of riverbed material results from operation of the river outlet works at discharges greater than 3,000 cu ft/s (85 cu m/s). Several solutions to the problem were suggested, including a limitation on operation of the river outlet to 3,000 cu ft/s (85 cu m/s). Studies were conducted to determine the effectiveness of the spillway discharge in clearing various amounts of deposited material from the basin. As a result of these studies, a recommended spillway discharge was applied to the Canyon Ferry stilling basin to clean 900 cu yd (688 cu m) of riverbed material from the basin. Soundings of the basin were taken immediately after the suggested release and confirmed the model results. (See also W77-00775) (Sims-ISWS)
W77-00834

SEDIMENTATION IN COON CREEK VALLEY, WISCONSIN,
California Univ., Los Angeles. Dept. of Geography.
For primary bibliographic entry see Field 4D.
W77-00835

CHANNEL IMPROVEMENTS OF THE MISSOURI RIVER,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W77-00836

PATTERNS OF SCOUR AND FILL IN POOL-RAPID RIVERS,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
E. Silverston, and E. M. Laursen.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 5-125 - 5-136, 1976. 9 fig, 2 ref.

Descriptors: *Rivers, *Scour, *Deposition(Sediments), *Model studies, Mathematical models, Erosion, Sedimentation, Weirs, Control, Flow, Streamflow, Sediment transport, Hydraulics.
Identifiers: *Pool-rapid rivers.

The characteristics of the imaginary pool-rapid river studied in this investigation were completely arbitrary--but not unlike the Colorado River. It was concluded that the seemingly erratic behavior of pool-rapid rivers is subject to rational explanation: Because the change in head on a critical control (rapid or weir) is less than the change in equilibrium depth in the pool upstream, a pool will eventually scour with an increase in flow and fill with a decrease in flow. However, because the supply of sediment to a pool is dependent on the conditions at the outlet of the pool just upstream, initially there may be either scour or fill in the downstream pool with an increase in flow. Indeed, a pool following several other pools may behave in a seemingly erratic manner because its sediment supply is affected by what happens in each of the upstream pools. (See also W77-0075) (Sims-ISWS)
W77-00837

EFFECTS OF SEDIMENTATION ON COASTAL ZONE ORGANISMS,
New York Univ. Medical Center, N. Y. Lab. for Environmental Studies.
For primary bibliographic entry see Field 5C.
W77-00838

CHEMICAL AND BIOLOGICAL MOBILIZATION OF HEAVY METALS FROM ESTUARINE SEDIMENTS,
Corps of Engineers, San Francisco, Calif. South Pacific Div.
For primary bibliographic entry see Field 5C.
W77-00839

SEDIMENT TRANSPORT IN THE COASTAL ZONE,
Massachusetts Inst. of Tech., Cambridge. Ralph M Parsons Lab for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 2L.
W77-00840

SEDIMENT DISPERSAL IN WESTERN LAKE MICHIGAN NEAR TWO CREEKS, WISCONSIN, AND THE INFLUENCE OF AN INDUSTRIAL COOLING WATER DISCHARGE,
Wisconsin Univ., Madison. Sea Grant Program; and Wisconsin Univ., Madison. Geo-Environmental and Mineral Resources Program.
M. H. Kohler, and J. R. Moore.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 6-39 - 6-50, 1976. 7 fig, 5 ref.

Descriptors: *Sediments, *Lake Michigan, *Wisconsin, *Sediment transport, *Powerplants, Nuclear powerplants, Cooling water, Discharge(Water), Littoral drift, Sands, Gravels, Clays, Shores, Lakes, Erosion, Sedimentation, Sedimentology, Limnology, Thermal pollution, Path of pollutants.
Identifiers: *Two Creeks(Wis), *Two Rivers(Wis).

The sedimentary regime in Lake Michigan between Two Rivers and Two Creeks, Wisconsin was investigated during four field seasons, 1971-1974. The area was selected because a shoreline industrial cooling water discharge became operational in 1971. Sediment transport patterns, including natural short-term variabilities, were defined. Alterations in the near-shore deposition patterns were noted near the cooling water discharge. The following conditions were found to exist: the offshore sedimentary regime was composed of four types of sediment. Desiccated red clay of Valderan age (Pleistocene) was exposed, with little or no overlying recent sediment, primarily in nearshore waters in the northern half of the study area. Rocky gravels and gravelly sand predominantly occupied a lobate zone in the intermediate depths in the northern sector. Sand, mainly in the fine sand class, dominated the southern portion of the area, from the shoreline to depths exceeding 30 m (100 ft) and extended northward in a band east of the rocky gravels and gravelly sands. Muddy sands were found beneath the deepest waters and in intermittent patches elsewhere. As indicated by the increase in sorting and decrease in grain size, the net transport of sediments offshore was north to south through the study area. Along the shoreline, the transport direction periodically reversed, but the net transport was from north to south. Pleistocene drift deposits formed bluffs at the back-beach north of Two Creeks and acted as a source for the modern sediments. (See also W77-00775) (Sims-ISWS)
W77-00841

COASTAL EROSION IN EASTERN LAKE MICHIGAN,
University of South Florida, Tampa. Dept. of Geology.
R. J. Davis Jr.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 6-51 - 6-61, 1976. 5 fig, 1 tab, 10 ref. Army DACW 72-70-0037, Army DACW 72-73-C-0003.

Descriptors: *Lake Michigan, *Beach erosion, *Shores, Erosion, Storms, Waves(Water), Winds, Lakes, Water levels, Geology, Geomorphology, Beaches, Weather data, Meteorological data, Sediments, Sedimentation.

Rapid and extensive erosion has taken place throughout the eastern coast of Lake Michigan during the past several years (1968-73). The result has been millions of dollars of property loss and damage. Detailed monitoring of 17 beach profiles along nearly 200 miles of the Lake Michigan coast has provided substantial insight into the nature of the erosion and its probable causes: Rapidly rising lake level caused the beach and adjacent dunes or bluffs to be vulnerable to wave attack. Erosion was quite localized during the first two years of the study and did not become universal until the final year (1972-73). During most times, local factors predominated in controlling erosion and/or accretion on the coast. Longshore sand bars, coastal composition, and shoreline configuration were most significant. Erosion was common during the intense storms of late fall just prior to the formation of coastal ice and to a lesser extent just

after ice melting in early spring. Single storms seemed to cause the bulk of the annual erosion at a given site. Rapid recovery of the beach seemed to take place between individual storms, however, during later fall, their frequency was such that recovery was not possible. (See also W77-00775) (Sims-ISWS)
W77-00842

A TIME RELATED AUTOMATIC TOTAL-LOAD SEDIMENT SAMPLER,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
K. G. Renard, J. R. Simanton, and L. D. Donica.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 7-17 - 7-29, 1976. 9 fig, 1 tab, 6 ref.

Descriptors: *Instrumentation, *Sediments, *Sampling, Runoff, Equipment, Potentiometers, Sedimentation, Erosion, Water sampling, Electronic equipment, Electrical equipment, Watersheds(Basins), Sedimentology.
Identifiers: *Sediment samplers.

A total-load, automatic, sediment sampler was developed and tested for use with small runoff measuring flumes. The system collected individual, total-load, sediment samples which provided periodic sediment concentration data during a runoff event. The system consisted of two parts, the sampler and the collector. The sampler was a vertical slot that traversed on a horizontal rail through the flow at the flume's exit. The traverse speed was regulated by flow depth and aliquot size. The collector was a revolving table with a capacity of 18 2-liter (about 0.5 gal) bottles. Table rotation was regulated by a timer and a new bottle was filled with each traverse. The time of each traverse was recorded on the stage record. The system was powered by a 12-volt, DC battery charged by a solar generator, which allowed using the system in remote areas where conventional electrical power was not available. (See also W77-00775) (Sims-ISWS)
W77-00843

THE USE OF COLOR INFRARED PHOTOGRAPHY FOR THE DETERMINATION OF SUSPENDED SEDIMENT CONCENTRATIONS AND SOURCE AREAS,
Forest Service (USDA), Fort Collins, Colo. Arapaho-Roosevelt National Forest.
D. L. Rosgen.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 7-30 - 7-42, 1976. 11 fig, 1 tab, 16 ref.

Descriptors: *Remote sensing, *Aerial photography, *Suspended solids, *Turbidity, Streams, Watersheds(Basins), Mountains, Snowmelt, Runoff, On-site investigations, Sampling, Erosion, Channel erosion, Photography, Infrared radiation, Sediments, Sediment discharge, Data processing, Analytical techniques.

The concepts and special techniques for applying color infrared photography in sediment studies were presented. These techniques were developed and evaluated through a low elevation color infrared photography flight and concurrent water quality sampling conducted on 164 km (100 miles) of stream over the West Fork of the Madison River in southwestern Montana. The concentrations and sources of sediment produced during peak snowmelt runoff were determined by photo densitometric analysis coupled with specifically located ground control stations. Excellent correlations were established by regression analysis of the ground truth variables including stream width to discharge and suspended sediment to turbidity. Photo density was correlated with suspended sediment and turbidity. Both produced strong correlations which were significant at the 99% confidence level. These correlations made it possible to determine reliable estimates of sediment concentrations from the aerial photography where stream measurements were not obtained. The photographic analysis indicated that the majority of the suspended sediment sources during the snowmelt runoff event were derived primarily from channel erosion. Additional interpretations which can be derived from photo analysis were also presented and discussed. (See also W77-00775) (Sims-ISWS)
W77-00844

GAGING SEDIMENT-LADEN FLOWS WITH V-NOTCH WEIRS,
Agricultural Research Service, Columbia, Mo. North Central Watershed Research.
K. E. Saxton, and J. F. Ruff.
In: Proceeding of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 7-43 - 7-53, 1976. 4 fig, 1 tab, 9 ref. ARS 12-14-3001-223.

Descriptors: *Weirs, *Gaging stations, *Stream gages, *Streamflow, Flow, Runoff, Measurement, Suspended solids, Deposition(Sediments), Discharge(Water), Hydraulic structures, Calibrations, Model studies, Hydraulic models, Alluvial channels.
Identifiers: Broad-crested weirs, V-notch weirs, Weir calibrations.

Watersheds with areas of less than 1 sq mi (2.59 sq km) often have streamflow with stages that rise and fall rapidly. These rapid stage changes prevent accurate field calibration of streamflow gaging stations by usual techniques; therefore, a reliable, precalibrated measuring device is necessary. Also, the streamflow from these small watersheds is often heavily laden with sediment (up to 200,000 ppm), and the alluvial stream channels change their cross section and slope upstream of the measuring device. These sloping and aggrading approach channels can change the stream gage calibration. Broad-crested, V-notch weirs, developed by the U. S. Soil Conservation Service, have been used extensively. Recent evidence has shown that different approach channel slopes and shapes and sediment deposits cause significant deviations from the original calibrations. Model studies were conducted to define the effect of approach channel geometry and sediment deposits on the weir calibrations. A rigid-boundary model was used for the tests. Channel slopes were 0.0, 0.5, 1.0, 1.5, and 2.0% for several approach channel cross sections. The results provided improved calibrations for broad-crested, V-notch weirs for gaging sites in alluvial channels. (See also W77-00775) (Sims-ISWS)
W77-00845

SEDIMENT RUNOFF DURING HIGHWAY CONSTRUCTION,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4C.
W77-00847

SEDIMENT MOVEMENT INDUCED BY SHIPS IN RESTRICTED WATERWAYS,
Texas A and M Univ., College Station. Ocean Engineering Program.
For primary bibliographic entry see Field 2L.
W77-00886

CURRENTS AND CIRCULATION IN THE COASTAL WATERS OF LOUISIANA,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
For primary bibliographic entry see Field 2L.
W77-00887

MILD SLOPE STABLE CHANNELS. A STOCHASTIC DESIGN APPROACH,
Florida Univ., Gainesville. Dept. of Civil Engineering.
B. A. Christensen.
Florida Sea Grant Report presented at ASCE Annual Convention, held at San Diego, California, April 5-8, 1976. 28 p, 23 ref. SG-04-5-158-44.

Descriptors: *Erosion, *Sedimentation, *Soil properties, *Canal design, Canals, Channels, Stochastic processes, *Slopes, Synthetic hydrology, Design criteria, Slope stabilization, Channel morphology.
Identifiers: *Hydrodynamic lift, Channelization, *Design charts.

A method for design of a clear water stable channel in noncohesive soil deposits of sand or shells and with a bed slope which is so small that profiles with a horizontal middle part cannot be used, was developed. The influence of the hydrodynamic lift acting on the topmost layer of grains is taken into consideration by use of Einstein and El-Samnis' lift coefficient. The stochastic nature of this lift is considered by introduction of the probability of erosion. All formulas needed for the design and for development of the design charts are given. Due to space limitations, most of the derivations are omitted. The method is extended to stable trapezoidal and triangular cross sections. (NOAA)
W77-00896

COASTAL ENGINEERING DATA NETWORK,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 2L.
W77-00898

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 13. GEOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00913

SHORELINE EROSION: IMPLICATIONS FOR PUBLIC RIGHTS AND PRIVATE OWNERSHIP,
For primary bibliographic entry see Field 6E.
W77-00982

2K. Chemical Processes

APPLICATIONS OF AUTOMATIC EQUIPMENT TO WATER ANALYSIS,
For primary bibliographic entry see Field 5A.
W77-00597

A SIMPLE TUBE-TYPE WATER PROFILE SAMPLER,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5A.
W77-00641

HYDROCHEMISTRY OF THE PARANA RIVER,
Instituto Nacional de Limnologia, Santo Tomo (Argentina).
P. J. Depetris.
Limnology and Oceanography, Vol. 21, No. 5, p 736-739, September 1976. 3 fig, 2 tab, 9 ref.

Descriptors: *Water chemistry, *Rivers, *South America, *Sampling, Chemical analysis, Suspended solids, Dissolved solids, Chemicals, Surveys, Salts, Monthly, Rocks, Geochemistry, Erosion, Pollutant identification.
Identifiers: *Parana River(Argentina), *Argentina.

Recent monthly data from the Parana River showed that its hydrochemistry is controlled by the nature of the rocks in the basin, with significant contributions from saline environments during low discharge. The discharge-weighted mean dissolved salts concentration (79.8 mg/liter) allowed a new calculation of 56.7 mg/liter for the mean dissolved salts concentration of South American rivers. (Sims-ISWS)
W77-00644

DEPOSITS FORMED BY SUBGLACIAL PRECIPITATION OF CAC03,
California Univ., Los Angeles. Dept. of Geology.
B. Hallet.
Geological Society of America Bulletin, Vol. 87, No. 7, p 1003-1015, July 1976. 9 fig, 2 tab, 64 ref, 1 append. NSF GA-40497X.

Descriptors: *Calcium carbonate, *Limestones, *Chemical precipitation, *Glaciers, Carbonate rocks, Geology, Rocks, Geologic investigations, Geomorphology, Freezing, Chemistry, Ice, Calcium compounds, Laboratory tests.
Identifiers: Calcium carbonate precipitation, Subglacial limestone, Glacial geology, Glacial sliding, Freezing calcium carbonate solutions.

Limestone and other calcareous outcrops recently exposed by retreating temperate glaciers in the Rocky Mountains are widely covered with patchy carbonate coatings that formed as a result of chemical precipitation under the moving ice. They form because CaC03 dissolved from the bedrock on the stoss sides of bed obstacles is concentrated at the lee sides by the freezing of the meltwater in the regelation-slip process, which is an essential part of the mechanism by which temperate glaciers slide over their beds. Freezing experiments showed that ice grown from CaC03 solutions at rates similar to those expected in connection with regelation sliding had calcium ion concentrations 50 to 100 times smaller than the solutions; hence the freezing process strongly concentrated solutes in the melt. The experimental results were interpreted in terms of the pertinent phase relations, which were derived numerically on the basis of the most recent solubility data for calcite and an estimate of the freezing point lowering due to the presence of solutes. It was concluded that the subglacial chemical deposits indicate clearly that chemical exchange is active under temperate glaciers and that glacio-chemical processes do at times play a dominant role in modifying the glacial bed. Moreover, they are of particular interest because the chemical and physical processes by which they form may affect the behavior of entire glacial masses by impeding basal sliding. (Sims-ISWS)
W77-00658

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SEDIMENTS ORIGINATING FROM MISSOURI VALLEY LOESS,
Agricultural Research Service, Cheyenne, Wyo. North Central Region.
For primary bibliographic entry see Field 5B.
W77-00811

THE USE OF COLOR INFRARED PHOTOGRAPHY FOR THE DETERMINATION OF SUSPENDED SEDIMENT CONCENTRATIONS AND SOURCE AREAS,
Forest Service (USDA), Fort Collins, Colo. Arapaho-Roosevelt National Forest.
For primary bibliographic entry see Field 2J.
W77-00844

ANALYSIS OF HISTORICAL WATER-QUALITY DATA AND DESCRIPTION OF PLAN FOR A SAMPLING NETWORK IN CENTRAL AND SOUTHERN FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5A.
W77-00858

GEOLOGY AND GROUND-WATER RESOURCES OF CAMDEN COUNTY, NEW JERSEY,
Geological Survey, Trenton, N. J.
For primary bibliographic entry see Field 2F.
W77-00866

2L. Estuaries

THE EPIBIOTIC FLORA AND FAUNA OF THE SERPULID ZONE IN THE LITTORAL REGION ON THE MUKKAN COAST (BAY OF BENGAL), (IN ITALIAN),
Andhra Univ., Waltair (India).
K. V. Rao, and K. K. Rao.
Riv Idrobiol 12(2/3), p 71-95, 1973.

Descriptors: *Littoral, *Bays, Aquatic animals, Aquatic plants, Sediments, Coasts.
Identifiers: *Epibiotic fauna, Mukkan Coasts(India), *Bay of Bengal(India), *Epibiotic flora.

The serpulid zone of the Mukkan coast (India) 40 km N of Visakhapatnam (Bay of Bengal) was investigated qualitatively and quantitatively for faunal associations. A total of 87 spp. belonging to 18 animal groups are given. An average density of 30.82 organisms/cm3 was found. The importance of sessile animal growths as a littoral habitat is emphasized. The morphology of the substratum, wave action and sediment accumulation are the factors controlling animal diversity. Possible factors for the coexistence of the littoral animals are indicated.--Copyright 1976, Biological Abstracts, Inc.
W77-00530

DEVELOPMENT OF A SYSTEM TO DETECT AND MONITOR SEDIMENT POLLUTION,
Rhode Island Univ., Kingston. Dept. of Civil and Ocean Engineering.
For primary bibliographic entry see Field 5B.
W77-00539

HYDROGEN SULFIDE IN BOTTOM WATER NEAR A SEWAGE SLUDGE DUMPING SITE,
Brookhaven National Lab., Upton, N.Y. Dept. of Applied Science.
For primary bibliographic entry see Field 5A.
W77-00620

MANGANESE IN NARRAGANSETT BAY,
Rhode Island Univ. Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5A.
W77-00642

FORCES ON A ROUGH BED IN OSCILLATORY FLOW,
Cambridge Univ. (England). Dept. of Engineering.
J. F. A. Sleath.
Journal of Hydraulic Research, Vol. 14, No. 2, p 155-164, 1976. 8 fig, 14 ref.

Descriptors: *Ocean waves, *Drag, *Laminar flow, *Hydraulics, *Numerical analysis, Reynolds number, Roughness(Hydraulic), Analytical techniques, Boundary layers, Sediment transport.
Identifiers: *Lift force, *Oscillatory flow, Wave period.

Results are presented of numerical and analytical solutions for the drag and lift forces exerted in laminar flow on a two-dimensionally rough bed by wave action. Bottom friction causes attenuation of the waves as they approach the coast, and the longshore current is affected by bed friction as well as the sediment transport. Only two-dimensional bed roughness is considered when bed roughness length is large compared with the boundary layer thickness. When bed roughness size is small compared with the thickness of the viscous boundary layer, the lift force is negligible compared with the drag. The component of drag due to shear stress is much larger than the resolved component of pressure on the bed. For particles whose size is large compared with the thickness of the viscous boundary layer, the aforementioned conclusions do not apply. For moderate to high values of the ratio of amplitude of the horizontal component of velocity outside the boundary layer to kinematic viscosity divided by the wave period, the lift may completely dominate the initial motion of the sediment. (Singh-ISWS)
W77-00650

FINESTRUCTURE AND MICROSTRUCTURE OBSERVATIONS DURING THE PASSAGE OF A MILD STORM,
Washington Univ., Seattle. Dept. of Oceanography; and Washington Univ., Seattle. Applied Physics Lab.
M. C. Gregg.
Journal of Physical Oceanography, Vol. 6, No. 4, p 528-555, July 1976. 20 fig, 6 tab, 25 ref. ONR N00014-69-A-0200-6049.

Descriptors: *Oceans, *Storms, *On-site investigations, *Pacific Ocean, *Temperature, Winter, Water temperature, *Salinity, Density, Fluctuations, Air-water interfaces, Heat transfer, Winds, Equations, Mixing, Data processing, Meteorology, Oceanography.
Identifiers: Finestructure, Microstructure.

Finestructure and microstructure observations of temperature and salinity were made over a two-week period in late winter at a site in the central North Pacific, during which time a mild storm, maximum winds of 18 kt, passed through the area. The strong initial lateral variability in T and S, but weak vertical stratification, was altered, apparently by mixing due to surface cooling and the storm winds to produce several discrete types of water. These discrete types of water began to spread laterally several days after the onset of the storm and resulted in a triple step structure of 50 m thick homogeneous layers at one location. The 2.5 m thick transition region at the base had a sharp interface, 0.25 m thick, but there was no evidence of entrainment. A few days later a mixed layer half as thick, apparently resulting from the intrusion of denser water beneath, showed a transition with numerous small-scale instabilities and an overturn on a 0.12 m thick interface directly below the mixed layer. In the stratified water below the surface layers, the levels of microstructure detected during the storm appeared little different from those found afterward. (Sims-ISWS)
W77-00653

A CYCLESONDE VIEW OF COASTAL UPWELLING,
Rosenstiel School of Marine and Atmospheric Science. Miami, Fla.
W. R. Johnson, J. C. Van Leer, and C. N. K. Mooers.
Journal of Physical Oceanography, Vol. 6, No. 4, p 556-574, July 1976. 18 fig, 26 ref, 1 append. NSF IDOE GX-33052, NSF DES72-0147 A03.

Descriptors: *Upwelling, *Pacific Ocean, *Oregon, *On-site investigations, Continental shelf, Continental slope, Instrumentation, Circulation, Flow, Water circulation, Ocean circulation, Velocity, Temperature, Water temperature, Density, Data processing, Oceanography.

In August 1973, 320 vertical profiles of temperature and horizontal velocity were recorded during a 64 h period by an array of three Cyclesondes in the coastal upwelling region off Oregon. The mean interior alongshore velocity was geostrophic and a linear function of density, with a near-surface, equatorward jet at mid-shelf, and a poleward undercurrent at the shelf break. The mean cross-shelf flow was relatively weak and substantially

ageostrophic; it was suggestive of a two-cell (co-rotating) circulation within the mid-shelf frontal zone and a two-cell (counter-rotating) circulation near the shelf break. The direction of the mean, near-bottom, cross-shelf flow was consistent with a bottom Ekman layer driven by the mean near-bottom alongshore flow. At mid-shelf, near-inertial motions with a vertical wavelength of 50 m, upward phase velocity, and downward group velocity persisted throughout the record. The hourly vector shears indicated a layer of persistent shear instability at the base of the upwarped permanent pycnocline at mid-shelf. There the near-inertial shear was twice as great as the mean shear; therefore, it may have played a dominant role in mixing processes. It was concluded that in coastal upwelling regions, a vertical resolution of 10-20% of the water depth and a temporal resolution of 10-20% of an inertial period are probably necessary and sufficient to produce coherent fields of the slowly varying horizontal velocity. (Sims-ISWS)
W77-00654

ON A MID-OCEAN THERMOCLINE REGIME,
Washington Univ., Seattle. Dept. of Oceanography.
P. Welander, and C-T. Liu.
Journal of Physical Oceanography, Vol. 6, No. 4, p 592-595, July 1976. 6 fig, 5 ref. NSF DES74-13339.

Descriptors: *Thermocline, *Oceans, *Water temperature, Winds, Temperature, Model studies, Mathematical models, Circulation, Equations, Ocean circulation, Heat transfer, Boundaries(Surfaces), Physical properties, Thermal properties, Oceanography.

In a uniform-depth ocean forced by a wind stress and surface heat flux (or surface temperature) which are independent of longitude, there exists a possible thermocline regime with vanishing east-west temperature gradient. The associated meridional-vertical circulation is entirely wind-driven, producing a deep thermal structure at high latitudes, a thin equatorial thermocline, and a vertical thermal front at the latitude of vanishing Ekman downwelling. Some numerical examples were given. (Sims-ISWS)
W77-00656

THE FORMATION OF THE YUCATAN CURRENT BASED ON OBSERVATIONS OF SUMMER 1971,
National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
R. L. Molinari.
Journal of Physical Oceanography, Vol. 6, No. 4, p 596-602, July 1976. 5 fig, 1 tab, 4 ref. NSF AG-253.

Descriptors: *Currents(Water), *Ocean currents, *Thermal properties, Temperature, Salinity, Buoys, Coriolis force, Circulation, Ocean circulation, Water circulation, Oceanography.
Identifiers: *Yucatan current, *Caribbean Sea, *Gulf Stream, Drifter data.

Temperature, salinity, and Lagrangian current data collected during the summer of 1971 in the western Caribbean Sea were employed to evaluate the ageostrophic components of the flow in the formation region of the Yucatan Current. The ratio of tangential and centripetal accelerations to Coriolis acceleration for data averaged over 24 h periods remained less than 10% except in two areas. An anticyclonic turn, centered at 19 deg 30 min N, 86 deg W, had the largest centripetal accelerations, and in the region of Cozumel Island significant tangential accelerations occurred. The large-scale accelerations and additional evidence supported the hypothesis that inertial effects dominate in the formation of the Yucatan Current. (Sims-ISWS)
W77-00657

TIDAL PRISM - INLET AREA RELATIONSHIPS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. T. Jarrett.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-022 327, Price codes: A03 in paper copy, A01 in microfiche. GITI Report 3, February 1976. 55 p, 19 fig, 4 tab, 20 ref, append.

Descriptors: *Inlets(Waterways), *Tides, *Jetties, Channels, Bays, Estuaries, Flow, Tidal bores, Harbors, Waves(Water), Coasts, Shores, Oceanography.
Identifiers: *Tidal prisms.

The tidal prism-inlet area relationships for inlets on sandy coast established by M. P. O'Brien (See 74-03695) were reanalyzed using his data and data published by other investigators. In addition, tidal prism and inlet cross-sectional area data developed in the Inlet Classification Study, a subfeature of the Corps of Engineers General Investigation of Tidal Inlets, were also used. These data resulted in a total of 162 data points for 108 inlets--59 of which were located on the Atlantic coast, 24 on the Gulf coast, and 25 on the Pacific coast of the United States. The data were grouped into three main categories, namely: (1) all inlets, (2) unjettied and single-jettied inlets, and (3) inlets with two jetties. Within each of these three categories, the data were further subdivided into: (1) inlets on all three coasts, (2) inlets on the Atlantic coast, (3) inlets on the Gulf coast, and (4) inlets on the Pacific coast. Regression analysis was performed on each set of data to determine the equations of best fit and to establish 95% confidence limits for the equations and the constants in the equations. The results of the regression analysis, which in all cases yielded an equation of the form $A = C(P \text{ to the nth power})$, in which C and n are constants determined by the regression analysis, indicated that the tidal prism-inlet area relationship is not a unique function for all inlets, but varies depending on inlet location and whether or not the inlet has been stabilized with a dual jetty system. (Sims-ISWS)
W77-00664

HEAT DISPERSION IN PHYSICAL ESTUARINE MODELS; REPORT 2, EXPERIMENTS IN THE DELAWARE RIVER MODEL,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 5B.
W77-00665

INTERRELATIONSHIPS BETWEEN CERTAIN MICROORGANISMS AND SOME ASPECTS OF SEDIMENT-WATER NUTRIENT EXCHANGE IN TWO BAYOU ESTUARIES, PHASES I AND II,
University of West Florida, Pensacola. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-00674

OYSTER SETTING AND EARLY SPAT SURVIVAL AT CRITICAL SALINITY LEVELS ON NATURAL SEED OYSTER BEDS OF DELAWARE BAY,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Zoology.
H. H. Haskin, and S. M. Tweed.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-259 537, Price codes: A05 in paper copy, A01 in microfiche. Water Resources Research Institute, Rutgers University, New Brunswick, N. J. July, 1976. 66 p, 8 fig, 24 tab, 49 ref. OWRT B-037-NJ(1), 14-01-0001-3307.

Descriptors: *Oysters, *Predation, *Mortality, *Salinity, *Estuarine fisheries, Estuaries, Mollusks, Shellfish, Bottom fauna, Fouling, Competition, Benthos, Bays.
Identifiers: *Oyster seed beds, *Salinity gradient, *Delaware Bay, Oyster drills, Fouling community, Mud crabs.

Long-term observations on the natural seed oyster beds of Delaware Bay had shown that although supply of oyster larvae and setting potential did not differ over the area, survival of spat was higher by a factor of 10 in fresher up-bay areas compared with higher salinity beds dowb-bay, The oyster drill, Urosalpinx cinerea Say, a common predator on higher salinity beds, accounted for some of the differential. The question was whether other benthic species differences, controlled by salinity differences on the beds, were also important. To answer this question two beds, one above and one below the drill line, were compared in detail in spat survival. During this project the drill population on the lower bed was sharply reduced, probably resulting from an unusual pattern of river flows. Set on native shell compared with clean test shells was reduced to 50% and 20% on the upper and lower bed respectively. Spat mortality in the first week after setting, averaging about 40% on both beds, was mostly due to predation by the large population of xanthid crabs (150-250 per M2). Beyond the first week, mortality rates declined more rapidly on the lower than on the upper bed as spat outgrew small predators. The resulting reversal in survival ratios on upper and lower beds, coincident with reduced drill populations on the lower bed, implies strongly that in the past the drill has been largely responsible for the comparatively poor survival of early set on the lower beds.
W77-00676

HOUSING DEVELOPMENT CANALS IN THE COASTAL ZONE OF THE GULF OF MEXICO: ECOLOGICAL CONSEQUENCES, REGULATIONS, AND RECOMMENDATIONS,
National Marine Fisheries Service, St. Petersburg, Fla. Environmental Assessment Div.
For primary bibliographic entry see Field 6G.
W77-00701

DETRITUS FORMATION FROM EELGRASS (ZOSTERA MARINA L.): THE RELATIVE EFFECTS OF FRAGMENTATION, LEACHING, AND DECAY,
Dalhousie Univ., Halifax (Nova Scotia).
For primary bibliographic entry see Field 5C.
W77-00715

SEASONAL FLUCTUATIONS OF DIELDRIN RESIDUES IN THE TISSUES OF THE MARSH CLAM, RANGIA CUNEATA, FROM A TEXAS ESTUARY,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 5B.
W77-00717

WORKSHOP PROCEEDINGS: CITIZEN PARTICIPATION IN WATER RESOURCES DECISION-MAKING,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-00730

PROCEEDINGS OF THE THIRD FEDERAL INTER-AGENCY SEDIMENTATION CONFERENCE 1976.
Water Resources Council, Washington, D.C. Sedimentation Committee.
For primary bibliographic entry see Field 2J.
W77-00775

SOURCES AND SEDIMENT YIELD OF HAWAIIAN WATERSHED AND COASTAL SEDIMENTS,
Hawaii Univ., Honolulu. Dept. of Geology and Geophysics; and Hawaii Inst. of Geophysics.
For primary bibliographic entry see Field 2J.
W77-00791

ROLE OF THE SEDIMENTATION IN THE SELF-PURIFICATION OF THE SCHELDT ESTUARY,
Laboratoire de Recherches Hydrauliques, Antwerp (Belgium).
For primary bibliographic entry see Field 5B.
W77-00815

SEDIMENT TRANSPORT CHARACTERISTICS OF THE UPPER SAN FRANCISCO BAY-DELTA ESTUARY,
Bureau of Reclamation, Sacramento, Calif. Mid-Pacific Regional Office .
M. Rumboltz, J. F. Arthur, and M. D. Ball.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 4-12 - 4-25, 1976. 10 fig, 2 tab, 13 ref.

Descriptors: *Sediment transport, *Estuaries, *Rivers, *California, Sediments, Turbidity, Suspended solids, Export, Canals, Bypasses, Floodways, Deltas, Flow, Sediment discharge, Tidal waters, Salinity, Winds, Water circulation.
Identifiers: *San Francisco Bay-Delta Estuary, *Sacramento River, *San Joaquin River.

Sediment transport in the San Francisco Bay-Delta Estuary of California is being investigated by an Interagency, Federal and State study group as part of an overall investigation to assess the impact of water resources development on the ecology of the Estuary. Transport characteristics of suspended sediment in the upper San Francisco Bay-Delta system east of San Pablo Bay were discussed. Analysis of the river discharge and suspended solids data (1960-1969) indicated that over 88% of the sediment discharge by the rivers to the Delta originates in the Sacramento River basin. The analysis also indicated that during the November through April period, 80% of the annual sediment discharge from the rivers enters the Delta. Suspended solids transport through the Estuary was primarily controlled by river inflow, export pumping, tidal exchange, two-layered flow estuarine circulation, and surface wave action. A brief summary of sediment discharge to the Bay-Delta Estuary and a general description of the factors influencing transport of sediments through the Estuary were presented. (See also W77-00775) (Sims-ISWS)
W77-00817

SEDIMENT TRANSPORT STUDIES IN THE DELTA-MENDOTA CANAL AND THE CALIFORNIA AQUEDUCT,
Bureau of Reclamation, Sacramento, Calif. Mid-Pacific Regional Office.
J. F. Arthur, and N. W. Cederquist.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 4-88 - 4-100, 1976. 4 fig, 3 tab, 15 ref.

Descriptors: *Sediment transport, *Sediments, *Clams, *Canals, California, Export, Sedimentation, Aqueducts, Deposition(Sediments), Surveys, Sampling, Suspended solids, Sediment load, Sediment distribution, Sediment yield, Sediment control, Sediment rates, Sedimentology.
Identifiers: *California Aqueduct, *Delta-Mendota Canal(Calif), *Sacramento River, *San Joaquin River.

The Delta-Mendota Canal (DMC), completed in 1951, has experienced capacity problems, currently attributed to a combination of design deficiency and the accumulation of sediment and clam deposits. The findings of studies conducted in 1973-74 on the sediment-clam deposition problem in the DMC were summarized and it was concluded that sediment in the water is bound by the excreta of the Asiatic clam (Corbicula manilensis). This accumulation of sediment-clam deposits causes a reduction in canal capacity, in addition to the design deficiency loss. Also, sediment transport characteristics of the DMC and the California Aqueduct were compared. Significant differences between the two intake facilities were indicated. Approximately 70% of the sediment entering the Aqueduct was deposited in Clifton Court Forebay and Bethany Reservoir, while only 10% was deposited in the DMC intake channel. The difference in sediment deposition was attributed to differences in design and operation of the intake facilities. The concentration of total suspended solids entering the DMC was found to vary directly with total delta export and vary inversely with the solids concentration of the Sacramento River, the primary source of delta export water. (See also W77-00775) (Sims-ISWS)
W77-00822

EFFECTS OF SEDIMENTATION ON COASTAL ZONE ORGANISMS,
New York Univ. Medical Center, N. Y. Lab. for Environmental Studies.
For primary bibliographic entry see Field 5C.
W77-00838

SEDIMENT TRANSPORT IN THE COASTAL ZONE,
Massachusetts Inst. of Tech., Cambridge. Ralph M Parsons Lab for Water Resources and Hydrodynamics.
W. D. Grant, and O. S. Madsen.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 6-28 - 6-38, 1976. 3 fig, 13 ref.

Descriptors: *Sediment transport, *Coasts, *Waves(Water), *Currents(Water), Deposition(Sediments), Scour, Model studies, Mathematical models, Suspended solids, Sediments, Sands, Equations, Breakwaters, Computers, Flow, Topographic mapping, Ocean waves, Shores.
Identifiers: Oscillatory flow.

The results of research on initiation of motion and sediment transport in unsteady oscillatory flow from a research program underway at Massachusetts Institute of Technology were summarized. The results showed the Shields criterion for initiation of sediment motion in steady flow to hold also for unsteady, oscillatory flow when the Shields parameter was based on the maximum bottom shear stress. A quasi-steady application of the Einstein-Brown sediment transport relationship was shown to yield a fairly good representation of experimental data on sediment transport in oscillatory flow. The relationship was then modified for application to sediment transport by waves and currents. An example was given from a computer application for sediment transport in the vicinity of a semi-infinite breakwater subject to a spatially varying wave and current field, in which the maximum wave orbital velocity, u sub b = 1.15 m/sec (3.8 ft/sec), was considerably larger than the current velocity, U = 0.15 m/sec (0.5 ft/sec). The results were presented in a topographical map showing areas of scour and accretion of the order 2 cm/day (0.78 in) at a maximum. (See also W77-00775) (Sim-ISWS)
W77-00840

BIOLOGICAL EFFECTS OF HEAVY METALS ON JUVENILE BAY SCALLOPS, ARGOPECTEN IRRADIANS, IN SHORT-TERM EXPOSURES,
National Marine Fisheries Service, Milford, Conn. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-00872

UPTAKE AND RELEASE OF PHOSPHORUS BY PHYTOPLANKTON IN THE CHESAPEAKE BAY ESTUARY, USA,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5C.
W77-00874

DIVERSITY OF MARINE INVERTEBRATES IN A THERMAL EFFLUENT,
Delaware Univ., Lewes. Coll. of Marine Studies.
For primary bibliographic entry see Field 5C.
W77-00883

SEDIMENT MOVEMENT INDUCED BY SHIPS IN RESTRICTED WATERWAYS,
Texas A and M Univ., College Station. Ocean Engineering Program.
Y-C. Liou, and J. B. Herbich.
Report No. TAMU SG 76-209, August 1976. 98 p, 28 fig, 7 tab, 34 ref. Also as COE Report No. 188. TAMU-SG-76-209, SG-04-5-158-19.

Descriptors: *Sediment transport, Ships, *Channels, *Water pollution, Numerical analysis, Computer programs, Inland waterways, Model studies.
Identifiers: *Waterways(Transportation), *Waterways(Watercourses), Momentum theory, Channel bottom, Ship's propellers.

A numerical model using the momentum theory of the propeller and Shields' diagram was developed to study sediment movement induced by a ship's propeller in a restricted waterway. The velocity distribution downstream of the propeller was simulated by the Gaussian normal distribution function. The shear velocity and shear stress were obtained using Sternberg's formulas. Once the ship's speed, depth of the waterway, RPM and diameter of the propeller, and draft of the ship are given, the velocity distribution and the grain size of the initial motion could be obtained from this model. A computer program was developed to solve it. Case studies are presented to show the influence of significant factors on sediment movement at the channel bottom induced by a ship's propeller. (NOAA)
W77-00886

CURRENTS AND CIRCULATION IN THE COASTAL WATERS OF LOUISIANA,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
S. P. Murray.
Publication No. LSU-T-76-003 and CSI Technical Report No. 210, June 1976. 39 p, 45 fig. N00014-75-C-0192.

Descriptors: *Estuaries, *Coasts, *Tidal waters, *Salinity, *Salt balance, *Tides, Hydrography, Water resource, *Water circulation, *Currents(Water), *Tidal effects, Bays, Effluents, *Louisiana, Gulf of Mexico, Wetlands.
Identifiers: Water motion, Salt wedge, Coastal marshes, *Tidal currents.

A review of knowledge of circulation and currents in the coastal water of Louisiana indicates that we lack a rudimentary knowledge of the mechanics of water motion along most of the coastline. Detailed salt balance and turbulent mixing studies should now be undertaken. Apparent ignorance prevails except for seasonal salinity patterns and the occasional isolated study. Detailed knowledge of the

dynamics of our prolific coastal bays and estuaries is embarrassingly poor. Existing numerical models of Barataria Bay and Chandeleur-Breton Sound may offer a shortcut to overcoming this disadvantage. Tidal passes, minor river mouths, and the circulation within the wetlands proper have been subject to sporadic, short-term measurement programs, but definitive studies of the flux of mass, heat, salt, and other important scalars have yet to be performed. A list of research priorities to eventually allow better utilization of our coastal waters is presented. (NOAA)
W77-00887

MARINE AND ESTUARINE SANCTUARIES. PROCEEDINGS OF THE NATIONAL WORKSHOP ON SANCTUARIES, 28-30 NOVEMBER 1975, WASHINGTON, D. C.,
Virginia Inst. of Marine Science, Gloucester Point.
M. P. Lynch, B. L. Laird, and T. F. Smolen.
Special Scientific Report No. 70, February 1974. 219 p, 10 tab. NOAA 3-35406.

Descriptors: *Estuaries, *Coastal plains, *National Parks, *Ecosystems, *Land use, *Resources development, *Water pollution, Natural resources, Meetings, Continental shelf, Conservation, Management, Environmental control, Waste disposal, Minerals, Exploration, Oil industry, Fisheries, Recreation.
Identifiers: *Sanctuaries, Outer Continental Shelf, Coastal Zone Management, Ocean dumping.

This report has been prepared primarily with the intent of providing the participants in the Workshop on Sanctuaries with background information on the issue of marine and estuarine sanctuaries. It is also intended to present a series of concepts as to what might constitute marine or estuarine sanctuaries. A brief review is presented of legislative history, other programs, and various concepts as to what constitutes or should constitute marine and estuarine sanctuaries. Although one goal of the workshop is some consensus relative to sanctuaries, another goal is the clear exposition of partisan views in context with other either supporting or opposing views. Information is given on various governmental and private programs. Legitimate uses of the coastal zone are summarized. This workshop will provide the Department of Commerce with much of the information base needed for them to establish the policy of the Federal Government with regard to the sanctuary provisions of Public Law 92-532 and Public Law 92-583. (NOAA)
W77-00888

INFLUENCE OF THE SUPRAMOLECULAR MARINE ENVIRONMENT ON PITTING CORROSION,
Texas A and M Univ., College Station. Ocean Engineering Program.
For primary bibliographic entry see Field 8G.
W77-00890

REGULATION OF COASTAL ZONE DEVELOPMENT FOR FISHERIES MANAGEMENT,
Alabama Dept. of Conservation and Natural Resources, Montgomery.
For primary bibliographic entry see Field 6B.
W77-00891

THE SOCIAL AND ECONOMIC IMPORTANCE OF THE CARONI SWAMP IN TRINIDAD AND TOBAGO,
Michigan Univ., Ann Arbor. Dept. of Natural Resources.
For primary bibliographic entry see Field 6G.
W77-00893

MARINE POLLUTION ARTICLES IN THE LAW OF THE SEA SINGLE INFORMAL NEGOTIATING TEXT,
Rhode Island Univ., Kingston. Law of the Sea Inst.
For primary bibliographic entry see Field 5G.
W77-00894

COASTAL ENGINEERING DATA NETWORK,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
R. J. Seymour, M. H. Sessions, S. L. Wald, and A. E. Woods.
Sea Grant Publication 50; IMR Reference 76-11, July 1976. 129 p, 24 fig, 4 ref, append. SG-04-6-158-44021.

Descriptors: *California, *Sediment transport, *Data processing, *Erosion, *Ocean waves, Waves(Water), Climates, Networks, Seasonal.
Identifiers: *Wave energy, *Coastal wave climate, Seasonal trends.

A low cost system for automatically measuring and recording coastal wave data is being operated on a prototype basis. It utilizes standard dial up telephone lines to connect remotely located bottom mounted pressure sensors to a central station. The central station is run by a programmed minicomputer to automatically call each remote station in sequence, and take a continuous record of water pressure fluctuations versus time for approximately twenty minutes. These data are recorded on magnetic tape for processing by the same computer system. Periodically, data are processed and significant wave height, and energy versus period, computed. Currently four stations are being monitored over a thirty-seven mile length of Southern California coastline. Sites are located off the ends of established piers which provide suitable power, telephone connections, and bridge the surf zone. (NOAA)
W77-00898

DESIGN LIMITS ON CRITICAL FLOAT EMERGENCE IN A TETHERED FLOAT BREAKWATER,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 8C.
W77-00899

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 1. MARINE MAMMALS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00901

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 2, MARINE BIRDS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00902

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 3. MARINE BIRDS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00903

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 4. MARINE BIRDS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00904

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 5. FISH, PLANKTON, BENTHOS, LITTORAL.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00905

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 6. FISH, PLANKTON, BENTHOS, LITTORAL.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W77-00906

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 7. FISH, PLANKTON, BENTHOS, LITTORAL.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W77-00907

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 8, EFFECTS OF CONTAMINANTS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W77-00908

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 9. CHEMISTRY AND MICROBIOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W77-00909

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 10. CHEMISTRY AND MICROBIOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W77-00910

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME II. PHYSICAL OCEANOGRAPHY AND METEOROLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00911

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 12. GEOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00912

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 13. GEOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00913

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 14. ICE.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00914

THE SHRIMP FISHERY OF THE SOUTH ATLANTIC UNITED STATES: A REGIONAL MANAGEMENT PLAN.
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
For primary bibliographic entry see Field 6B.
W77-00918

THE INTERNATIONAL LAW OF THE SEA: A CASE FOR A CUSTOMARY APPROACH,
South Carolina Univ., Columbia. School of Marine Science.
For primary bibliographic entry see Field 6E.
W77-00956

PELAGIC TAR,
For primary bibliographic entry see Field 5B.
W77-00969

MODEL FOR A STUDY,
Army Engineer District, Baltimore, Md.
A. E. Robinson, Jr., and J. H. McKay.
Water Spectrum, Vol 5, No 3, p 19-26 (1973). 8 p, 12 photo.

Descriptors: *Chesapeake Bay, *Hydraulic models, *Bodies of water, *Estuaries, *Model studies, Currents(Water), Fluid mechanics, Hydraulic engineering, Hydraulic similitude, Hydraulics, Laboratory tests, Testing, Hydraulic design, *Maryland, Federal government, Grants.

Chesapeake Bay is beginning to feel the effects of both human intrusion and natural forces. Spreading algae, wind and wave erosion, and pollution are only a few of the problems that must be faced. In order to meet these problems, Congress authorized the construction of a hydraulic model of Chesapeake Bay. Federal and State agencies and university scientists are working on the planning and construction. When finished, it will be the largest and most complete model ever built, covering nine and a half acres. It will accurately reproduce the vertical and lateral distributions of current velocity, salinity, and tidal elevation. A 12-hour and 25-minute tidal cycle can be reproduced by the model in about 7.5 minutes, and a one-year testing period can be reproduced in a little over three and a half days. The model is expected to solve in advance problems of drilling, dredge a..d fill, oil and waste pollution, saltwater encroachment, and waste heat. This hydraulic model, when used in conjunction with both analytical and field studies, will greatly assist water resource planners in developing responsible management programs for the Bay. (Frank-Florida)
W77-00971

PROTECTION OF THE MARINE ENVIRONMENT FROM POLLUTION,
For primary bibliographic entry see Field 5G.
W77-00973

POWER FROM THE SEA,
For primary bibliographic entry see Field 3E.
W77-00977

THE SELLING OF THE SHELF,
For primary bibliographic entry see Field 5G.
W77-00979

DECISION TO LEASE OUTER CONTINENTAL SHELF LANDS,
Massachusetts Energy Policy Office, Boston.
For primary bibliographic entry see Field 6E.
W77-00981

SHORELINE EROSION: IMPLICATIONS FOR PUBLIC RIGHTS AND PRIVATE OWNERSHIP,
For primary bibliographic entry see Field 6E.
W77-00982

O'BRIEN V BARNES BUILDING COMPANY (DEFINITION OF TIDAL WETLANDS).
For primary bibliographic entry see Field 6E.
W77-01016

SHIGELLA RESEARCH IN THE SEA AND IN AN ESTUARY: I. FREQUENCY OF BACTERIOPHAGES IN POLLUTED WATER, (IN FRENCH),
Institut Royal des Sciences Naturelles de Belgique, Brussels.
For primary bibliographic entry see Field 5B.
W77-01020

SHIGELLA RESEARCH IN THE SEA AND IN AN ESTUARY: II. ATTEMPT TO INHIBIT THE ADSORPTION OF SHIGAPHAGES AND STUDIES OF SHIGELLA ON A SELECTIVE MEDIUM, (IN FRENCH),
Institut Royal des Sciences Naturelles de Belgique, Brussels.
For primary bibliographic entry see Field 5B.
W77-01021

SHIGELLA RESEARCH IN THE SEA AND IN AN ESTUARY: III. IN VITRO DETERMINATION OF THE SURVIVAL TIME OF SHIGELLA SONNEI YCD IN SEA WATER, (IN FRENCH),
Inst. R. Sci. Nat. Belg., Bruxelles, Belg. Institut Royal des Sciences Naturelles de Belgique, Brussels.
For primary bibliographic entry see Field 5B.
W77-01022

A COMPARISON OF BENTHIC COMMUNITIES OF STRUJNJAN AND KOPER BAYS WITH REGARD TO THEIR DIFFERING EXPOSURE TO POLLUTION STRESS, (IN SLOVENIAN),
Ljubljana Univ. (Yugoslavia). Morska Biologijo Postaja.
For primary bibliographic entry see Field 5C.
W77-01024

GROWTH AND PRODUCTION OF MASS SPECIES OF CHIRONOMIDS (DIPTERA, TENDIPEDIDAE) IN THE VOLGA PRE-DELTA, (IN RUSSIAN),
Kaspiiski Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Astrakhan (USSR).
For primary bibliographic entry see Field 5C.
W77-01025

LIPID TRANSFORMATION IN SEAWATER BY OIL-OXIDIZING MICROORGANISMS, (IN RUSSIAN),
Institute of Biology of the Southern Seas, Sevastopol (USSR). Dept. of Marine Sanitation Hydrobiology.
For primary bibliographic entry see Field 5A.
W77-01030

ENZYMATIC IN SITU MEASUREMENTS: NEW SEAWATER AND SEDIMENT MEASUREMENT METHODS, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskude.
For primary bibliographic entry see Field 5A.
W77-01031

DISTRIBUTION AND SIGNIFICANCE OF FECAL INDICATOR ORGANISMS IN THE UPPER CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-01061

SEASONAL SHIFTS IN THE SPAWNING SITE OF A NORTHEAST PACIFIC INTERTIDAL FISH,
British Columbia Univ., Vancouver, B. C. Inst. of Animal Resource Ecology.
J. B. Marliave.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 10, October 1975, p 1687-1691, 3 fig, 1 tab, 7 ref.

Descriptors: Environmental effects, *Fish, *Spawning, Temperature, Seasonal, Waves(Water), On-site investigations, *Pacific Ocean, Intertidal areas.
Identifiers: *Black prickleback, Xiphister atropurpureus.

Spawning sites of the black prickleback, Xiphister atropurpureus, were studied. Shifts in spawning sites during the winter and spring spawning periods were observed. This species selects underboulder substrates of shells, pebbles, and small rocks that provide spaces most nearly matching the cross-sectional body size of the adults for spawning sites. Spawning occurs under such a wide range of water temperatures from December to May that slight temperature variations between sites could not solely account for differences. The seasonal shift probably results because wave action decreases as temperatures increase during the spring. (Chilton-ORNL)
W77-01063

SEASONAL DISTRIBUTIONS OF LARVAL FLATFISHES (PLEURONECTIFORMES) ON THE CONTINENTAL SHELF BETWEEN CAPE COD, MASSACHUSETTS, AND CAPE LOOKOUT, NORTH CAROLINA, 1965-66,
National Marine Fisheries Service, Highlands, N. J. Sandy Hook Lab.; and National Marine Fisheries Service, Highlands, N. J. Middle Atlantic Coastal Fisheries Center.
W. G. Smith, J. D. Sibunka, and A. Wells.
NOAA Technical Report NMFS SSRF-691, June 1975. 68 p, 72 fig, 16 tab, 44 ref.

Descriptors: *Reproduction, *Spawning, *Seasonal, *Distribution patterns, Fish, Larvae, Eggs, Temperature, On-site investigations, Continental shelf, Atlantic Ocean.
Identifiers: Bothids, Pleuronectids, Cynoglossids, *Flatfish.

In a survey designed to locate spawning grounds and trace dispersion of fish eggs and larvae on the continental shelf, 4 families, 17 genera, and 15 species of fish were studied. The usual time of spawning was in the spring during seasonal temperature changes. Bothids have longer spawning seasons than pleuronectids, beginning in spring and continuing through early fall, in the southern half of the study area. Pleuronectids spawned in the spring in the northern half of the survey area. Cynoglossids spawned incidentally off North Carolina but most of their larvae were transported into the study area from spawning grounds south of Cape Lookout. Onset of spawning was triggered by spring warming and fall cooling with most species spawning within a relatively narrow range of temperatures. (Chilton-ORNL)
W77-01064

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

REVERSE OSMOSIS AS AN ADVANCED TREATMENT PROCESS,
Ontario Ministry of the Environment, Thunder Bay.
For primary bibliographic entry see Field 5D.
W77-00607

ECONOMICS OF A FREEZE DESALTING PROCESS USING COLD SEAWATER EFFLUENT OF A LIQUID NATURAL GAS PLANT.
Fluor Engineers and Constructors, Inc., Los Angeles, Calif.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 272, Price codes: A04 in paper copy, A01 in microfiche. Office of Water Research and Technology, Final Report OWRT/S-76/52, March 1976. 46 p, 20 fig, 2 tab. 14-30-3313.

Descriptors: *Desalination, *Freezing, *Capital costs, Cost estimates, Sea water, *Desalination processes.
Identifiers: Secondary refrigerant, Liquid natural gas, Crystalex process, *Freeze desalting process.

Process flow diagrams of the AVCO 'Crystalex' freeze desalting process and of the modified processes when using cold seawater effluent from the liquid natural gas plant are presented. The lower feed temperature makes it possible to reject heat at a lower temperature and reduces refrigerant compressor work. Budget estimates indicate that the water costs could be reduced up to 18 percent for the AVCO process when cold seawater at 33 degrees F from the liquid natural gas plant is used. Detailed water and capital costs are presented. (OWRT)
W77-00635

3B. Water Yield Improvement

WATER RESOURCE AUGMENTATION IN THE SOUTHWEST.
In: Energy, Water, and the West, November 2-5, 1975, Albuquerque, p 47-52, May 1976. 5 append.

Descriptors: *Water resources development, *Southwest US, *Weather modification, *Snowpacks, Water sources, Water supply, Water importing, Land tenure, Legal aspects.
Identifiers: *Colorado River Basin Project Act, *Winter orographic snowpack augmentation.

Among the provisions of the Colorado River Basin Project Act passed by Congress in 1968 was one which forbade the Interior Secretary from studying or recommending water importation from areas of surplus without approval of the states involved. Although this moratorium ends in 1978, there won't be water available for exportation to the Southwest at that time. Most of the western states' watersheds are on federal land, and over two-thirds of the total land area of these states is federally owned. Legal conflicts are especially serious in the Northwest where water is more plentiful and the rights of use are in dispute. A study of winter orographic snowpack augmentation in the Upper Colorado River Basin is cited as a means of weather modification for water resource enhancement. This process involves increasing winter precipitation by seeding moisture-laden air masses pushed by prevailing winds over high mountain ranges, after which moisture is extracted by natural processes. The weather modification technique and its effects are described. Social impacts are discussed along with recommendations for the establishment of policies to govern weather modification and associated water resources development. (See also W77-00542) (Jahns-Arizona)
W77-00546

EFFECT OF PRESCRIBED BURNING ON SEDIMENT, WATER YIELD, AND WATER QUALITY FROM DOZED JUNIPER LANDS IN CENTRAL TEXAS,
Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management.
For primary bibliographic entry see Field 4C.
W77-00679

WATER USE ON RANGELANDS,
Geological Survey, Denver, Colo.
F. A. Branson.
Reprint from Watershed Management on Range and Forest Lands; Proceedings of the Fifth Workshop of the United States/Australia Rangelands Panel, June 15-22, 1975, Boise, Idaho, p 193-209, March 1976. 27 fig, 1 tab, 68 ref.

Descriptors: *Water conservation, *Watershed management, *Evapotranspiration, *Soil-water-plant relationships, *Range management, Water users, Water harvesting, Water spreading, Runoff.
Identifiers: *Soil moisture stress, *Internal-plant stress.

Literature is reviewed and some previously unpublished information is presented for the following topics: (1) vegetation as related to precipitation and runoff, (2) vegetation-water-soil relationships, (3) water harvesting, (4) range water spreaders, and(5) water management on rangelands. Evapotranspiration quantities, often over 90 percent of precipitation that reaches rangelands, is reported for a number of plant communities. Internal-plant stress is related to many environmental variables but correlates most highly with lowest soil-moisture stress in the soil profile. Relative drought tolerance of plant species is indicated by maximal seasonal internal-plant stresses. The highest internal-plant stress measured was 117 bars for Atriplex nuttallii. Evapotranspiration estimates based on soil-moisture measurements were significantly correlated with maximum seasonal plant stress, bare soil, and percent live plant growth. In terms of plant growth, water use efficiency was lower for plants occupying dry sites than for plant of moist sites. Ancient and modern methods of harvesting water from artificial or modified watersheds are discussed. (Woodard-USGS)
W77-00846

AVAILABILITY OF GROUND WATER IN THE AREA SURROUNDING THE TRIDENT SUBMARINE CONSTRUCTION FACILITY, KITSAP COUNTY, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4B.
W77-00862

CHARACTERISTICS OF THE MAIN COMPONENTS OF WATER BALANCE OF SANDY DESERT PLANT COMMUNITIES, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Biogeography.
For primary bibliographic entry see Field 2I.
W77-00882

3C. Use Of Water Of Impaired Quality

MIGRATION OF SALT FROM FEEDLOT WASTE AS AFFECTED BY MOISTURE REGIME AND AGGREGATE SIZE,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 5B.
W77-00558

IRRIGATION OF CORN WITH SIMULATED MUNICIPAL SEWAGE EFFLUENT,
Michigan State Univ., East Lansing. Agricultural Experiment Station; and Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
For primary bibliographic entry see Field 5E.
W77-00610

WASTEWATER IRRIGATION - THE PRICE IS RIGHT,
Santa Rosa Public Works, Calif.
For primary bibliographic entry see Field 5D.
W77-00613

3D. Conservation In Domestic and Municipal Use

URBAN SEDIMENT PROBLEMS: A STATEMENT ON SCOPE, RESEARCH, LEGISLATION, AND EDUCATION.
American Society of Civil Engineers, New York. Task Committee on Urban Sedimentation Problems.
For primary bibliographic entry see Field 5B.
W77-00556

COMPUTERIZED CITY-WIDE CONTROL OF URBAN STORMWATER,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W77-00634

URBAN FLOOD WARNING AND WATERSHED MANAGEMENT ADVANCES IN METROPOLITAN MELBOURNE,
Melbourne and Metropolitan Board of Works. (Australia).
For primary bibliographic entry see Field 6F.
W77-00670

PLANNING FOR STORM WATER MANAGEMENT,
Watkins (G. Reynolds) Consulting Engineers, Inc., Lexington, Ky.
For primary bibliographic entry see Field 6F.
W77-00770

PROGRAM SPECIFICATION FOR THE SEWER AND WATER ACCOUNTS PROCESSING MODULE - READING USAC PROJECT.
For primary bibliographic entry see Field 5G.
W77-00773

EVALUATION OF ALTERNATIVE METHODS OF SUPPLEMENTAL RECHARGE BY STORMWATER BASINS ON LONG ISLAND, NEW YORK,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 4B.
W77-00853

3E. Conservation In Industry

ENERGY, WATER, AND THE WEST,
American Association for the Advancement of Science, Washington, D. C.
For primary bibliographic entry see Field 6D.
W77-00542

VIEWS FROM THE ENERGY INDUSTRIES.
For primary bibliographic entry see Field 6D.
W77-00548

NONWATER-INTENSIVE ENERGY RESOURCES.
For primary bibliographic entry see Field 6D.
W77-00549

TREATING WASTE DISCHARGE LIQUIDS FROM METAL HARDENING BATHS, PARTICULARLY CONTAINING NITRITE AND NITRATE COMPOUNDS,
For primary bibliographic entry see Field 5D.
W77-00693

PROCESS FOR THE TREATMENT OF WASTE WATER FROM A FIBERGLASS MANUFACTURING PROCESS,
Amchem Products, Inc., Ambler, Pa. (Assignee).
For primary bibliographic entry see Field 5D.
W77-00695

USE PATTERNS FOR DEPLETABLE AND RECYCLEABLE RESOURCES,
John F. Kennedy School of Government, Cambridge, Mass.
For primary bibliographic entry see Field 6C.
W77-00708

A MODEL OF RECYCLING AND POLLUTION CONTROL,
Florida Univ., Gainesville. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W77-00711

PURIFICATION OF INDUSTRIAL WASTE WATER - HAVING HIGH CONCENTRATION OF DISSOLVED SOLIDS BY TREATMENT WITH STRONG ACIDS OR BASES TO GIVE FERTILISERS AND FEED ADDITIVES.
For primary bibliographic entry see Field 5D.
W77-00743

REMOVAL AND RECOVERY OF CYANIDE AND ZINC FROM ELECTROPLATING WASTES BY SOLVENT EXTRACTION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W77-00747

LARGE-SCALE EFFLUENT TREATMENT IN THE DYESTUFFS INDUSTRY.
For primary bibliographic entry see Field 5D.
W77-00758

RECLAIMING WATER,
For primary bibliographic entry see Field 5D.
W77-00759

REMOVAL OF ORGANICS FROM WATER,
Permutit-Boby, Ltd., London (England).
For primary bibliographic entry see Field 5D.
W77-00924

DETOXIFYING INDUSTRIAL WASTEWATERS.
For primary bibliographic entry see Field 5D.
W77-00965

POWER FROM THE SEA,
M. Swann.
Environment, Vol 18, No 4, p 25-40 May 1976. 16 p, 3 fig, 5 photo, 3 dwg, 3 tab.

Descriptors: *Thermal power, *Thermal power plants, *Tropical regions, *Electrical power production, *Differential thermal analysis, Thermal studies, Thermal water, Efficiencies, Cost comparisons, Engineering structures, Environmental effects, Cost analysis, Heat exchangers, Thermal properties, Oceans, Sea water, Resource development, Temperature, Heat.
Identifiers: *Sea thermal power.

Researchers have estimated that sea thermal power is capable of providing 200 times the earth's present total power needs. Sea thermal power is produced by using heat engines to harness temperature differentials between surface and depths of tropical seas. It is also a renewable energy source which is replenished daily by solar radiation. Since surface temperatures of tropical seas never falls below 78 degrees F., plants can operate on a constant basis. This eliminates the need for expensive storage and retrieval systems. Diagrams are presented to demonstrate the sea thermal power generating cycle and an electricity generating unit. Cost factors, production techniques, environmental effects, and world impact are also discussed. (Reinders-Florida)
W77-00977

3F. Conservation In Agriculture

ECONOMIC AND WATER USE IMPACTS ASSOCIATED WITH ALTERNATIVE WATER PRICING POLICIES OF ESTABLISHED IRRIGATION DISTRICTS,
Oregon State Univ., Corvallis. Dept. of Agricultural and Resource Economics.
For primary bibliographic entry see Field 6C.
W77-00672

GROWN ORGANIC MATTER AS A FUEL RAW MATERIAL RESOURCE,
Ohio Agricultural Research and Development Center, Wooster.
W. L. Roller, H. M. Keener, R. D. Kline, H. J. Mederski, and R. B. Curry.
Report NASA CR-2608, October 1975. 132 p. 12 fig., 18 tab., 83 ref., 7 append. NGL-36-007-001.

Descriptors: *Fuels, *Organic matter, *Agriculture, *Feasibility studies, Energy conversion, Bibliographies, Crop production, Photosynthesis, Plant breeding, Costs, Biomass, Fertilizers.
Identifiers: Energy supplements.

In an analysis based on an extended literature search on biomass production, only doubtful feasibility was found for producing grown organic matter for fuel in competition with food, feed and fiber on U.S. acreages. The analysis considered biomass production, production alternatives, and the production of fuel from crop residues. In the search, 169 sources were annotated in eight topical areas: (1) biomass production of specific crops, 37 sources; (2) climatic effects data, 6 sources; (3) cultural practices effects on crop production, 38 sources; (4) input/output data, 29 sources; (5) multiple species production, 8 sources; (6) photosynthetic efficiency, 10 sources; (7) auxiliary information, 21 sources; (8) summarization, 20 sources. Information was evaluated according to costs and energy needs for biomass production among many plant species. Consideration was given to anticipated water needs, nutrient requirements and the effects of climate. Costs and energy estimates were made in a simulated analysis of projected systems of biomass production, using conventional production methods for six species with high production potential. In contrast with other studies on biomass production possibilities, no assumption was made that conditions can be made favorable for maximum production at minimum input costs. (Harris-Wisconsin)
W77-00700

ARTIFICIAL RECHARGE IN THE GRAND PRAIRIE, ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4B.
W77-00734

A STUDY OF THE RECURRENCE OF RAINFALL DEFICIENCY IN RELATION TO RICE CROP,
Indian Agricultural Research Inst., New Delhi.
P. N. Bhargava, P. Narain, and A. Pradhan.
Jnkvv (Jawaharlal Nehru Krishi Vishwa Vidyalaya) Res J 8(3/4), p 206-209, 1974.

Descriptors: *Rice, *Crops production, *Rainfall disposition, Growth rates.

Rainfall in July and Sept. has pronounced effect on rice yield. These months are crucial months involving the growth of the crop, flowering and seed formation period. The chance of occurrence of deficient rain in these months was of the order of 28% and 22%, respectively. The deficient rainfall in the months of July and Sept. is expected to recur on an average of every 4th and 5th yr.--Copyright 1976, Biological Abstracts, Inc.
W77-00746

THERMAL DISTURBANCES OF WHEAT WATER METABOLISM IN MODELS OF NATURAL METEOROLOGICAL COMPLEXES, (IN RUSSIAN),
Akademiya Nauk SSSR, Sverdlovsk. Inst. of Soil Sciences and Agrochemistry.
V. F. Al'Tergot, and S. S. Mordkovich.
Dokl Akad Nauk SSR Ser Biol 220(2), p 482-484, 1975.

Descriptors: *Wheat, *Metabolism, *Transpiration, Droughts, Irrigation, Model studies, Moisture content, Meteorology.
Identifiers: USSR.

The results of a study of the water content, transpiration rate and water retention of the 4th leaf of wheat cultivars Saratovskaya 29' (drought-resistant) and 'Minskaya' (drought-susceptible) under conditions simulating natural meteorological complexes are presented. 'Northern drought', an analog of drought in the Northwest of the USSR; 'dry heat', an analog of the sukhovei (dry wind) on irrigated fields; and 'moist heat', an analog of windless, hot weather on irrigated fields were studies.--Copyright 1976, Biological Abstracts, Inc.
W77-00755

PRODUCTION INVESTIGATIONS IN IRRIGATED AND NON-IRRIGATED WINTER WHEAT STAND DURING THE GROWING SEASON, (IN HUNGARIAN),
University of Agriculture, Godollo (Hungary).
A. Kovacs, and Z. Gaspar.
Novenytermeles 24(2), p 149-157, 1975.

Descriptors: *Wheat, *Crop production, *Irrigation, Growth rates, Sampling, Seasonal.
Identifiers: Phenophase, Winter wheat.

The effect of irrigation on phytomass production was followed in a well overwintered winter wheat (cultivar, 'Kavkaz') stand. The aboveground phytomass and the root mass by 5 cm levels were measured by phenophases (by samplings). The aboveground phytomass showed significant differences in the dynamics of development due to irrigation treatment, until the late May sampling. Due to a decline in water supply, the dry matter production decreased from flowering to ripening. This break did not show in the non-irrigated treatment where there remained a moderate tendency to increase all along.--Copyright 1976, Biological Abstracts, Inc.
W77-00963

CENTER PIVOT IRRIGATION,
W. Splinter.
Scientific American, Vol 234, No 6, p 90-99, June 1976. 10 p, 6 photo, 1 chart.

Descriptors: *Water demand, *Irrigation efficiency, *Irrigation engineering, *Irrigation practices,

Irrigation programs, Irrigation water, Irrigation wells, Distribution systems, Land development, Water distribution(Applied), Evapotranspiration, Leaching, Crop response, Crop production, Distribution patterns, Irrigation.
Identifiers: *Center-pivot irrigation.

Irrigation practices have not changed much in recent decades. However, the recent introduction of center-pivot irrigation is having noticeable impact. Mechanically, center-pivot irrigation involves a structured pipe system emanating from a central pivot to a length of up to one mile. Water is released at pre-planned rates and places, depending on the size and nature of the crop. Center-pivot systems are being rapidly adopted, primarily because of their automatic operation, ability to control application rate and frequency, and their easy accommodation to rolling terrain. Central-pivot have some drawbacks, however, including large, local water source requirements, and large electrical peak load periods. Development costs are approximately $350 per acre. Overall, the system's potential for widespread use seems unlimited. (Frank-Florida)
W77-00968

EFFECT OF SOIL MOISTURE ON DELIVERY OF NITROGEN-15 TO WINTER WHEAT PLANTS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Institut Fiziologii Rastenii i Agrokhimii.
For primary bibliographic entry see Field 2G.
W77-01035

IRRIGATION WITHOUT WASTES,
K. Shea.
Environment, Vol 17, No 5, p 12-15, July/August 1975. 4 p, 1 photo, 7 ref.

Descriptors: *Irrigation, *Irrigation design, *Irrigation efficiency, *Irrigation systems, *Irrigation engineering, Water distribution(Applied), Crop response, Drainage effects, Farm management, Irrigated land, Water control, Distribution systems, Sprinkler irrigation, Furrow irrigation.
Identifiers: *Isreal.

Even though the creation of large pumping stations and concretelined canals have allowed irrigation systems to become more massive, all systems still rely on gravity for distributing needed water. Unfortunately, the oldest and most widely used irrigation method, flood irrigation, is also the most wasteful and environmentally damaging. Israel has pioneered in creating the drip, or trickle, irrigation system. Studies have shown that it is particularly useful for specialty crops, such as fruit. It consists of a head connected to a main water supply and includes filters, valves, couplings, water meter, pressure gauge, and sometimes connections for injecting fertilizers. Conducting pipes and distribution tubes carry water down the rows. To these are attached emitters that can be adjusted to release water at rates varying from one to six liters per hour. Drip irrigation uses roughly one-third to one-half the quantity of water used in sprinkle and furrow irrigation. It can be used on all types of terrain, the interrow spaces are not watered, fewer weeds grow, and dollar savings are considerable. Major problems yet to be resolved include high cost, clogging and salt buildup. (Frank-Florida)
W77-01047

ARK-MO FARMS, INC. V. UNITED STATES (PROBLEM OF PROOF IN RECOVERING FOR FLOOD DAMAGE TO CROPS).
530 F2d 1384-87 (Ct Cl 1976). 4 p.

Descriptors: *Judicial decisions, *Dams, *Flood damage, *Crop production, *Hydrologic aspects, Hydrologic systems, Damages, Dam design, Hydrologic data, Economics, Risks, Governments, Discharge(Water), Jurisdiction, Negligence, Penalties(Legal), Water law, Arkansas.
Identifiers: *Dam effects, *Intentional torts, *Proximate causation, *Arkansas River.

Plaintiff owner of a 10,000 acre farm on the Arkansas River sued for damage to crops allegedly caused by the closing of a government dam. The suit failed for lack of proof of causation. The flooding allegedly was the consequence of the closing of Dam No. 2 of the McClellan-Kerr Arkansas River Navigation System, a multi-purpose project primarily created to provide a navigation channel. The project includes a number of flood control structures. Detailed and unchallenged hydrological data showed that the project had in fact decreased peaks, duration, and frequency of floods. Nevertheless, in absence of proof that the closing of the dam was the cause of the floods complained of, plaintiff could not recover. (Reinders-Florida)
W77-01050

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

TECHNOLOGY ASSESSMENT FOR NEW WATER DEVELOPMENT PROJECTS, (VOLUME I),
Virodyne Corp., Littleton, Colo.
For primary bibliographic entry see Field 6B.
W77-00527

SYSTEMATIC APPROACH TO WATER RESOURCES PLAN FORMULATION.
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W77-00532

ROLE OF PARTIAL GRADIENT ESTIMATION BY SIMULATION IN WATER RESOURCE PLAN FORMULATION, PART I,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W77-00533

A SEARCH TECHNIQUE FOR FORMULATING IMPROVED WATER RESOURCES CONFIGURATIONS, PART II,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W77-00534

SCREENING MODELS IN WATER RESOURCES PLANNING, PART III,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W77-00535

WATER RESOURCES IN THE WESTERN STATES: PROGRAM POLICY INITIATIVES.
For primary bibliographic entry see Field 6D.
W77-00547

MUNICIPAL WATERSHED MANAGEMENT SURVEY,
Southeastern Area State and Private Forestry, Atlanta, Ga.; and Geological Survey, Atlanta, Ga.
For primary bibliographic entry see Field 5B.
W77-00608

LIST OF PAPERS, 1967/1975, (INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH).
International Association for Hydraulic Research, Delft (Netherlands).
For primary bibliographic entry see Field 10C.
W77-00636

MODELING OF NONCONTINUOUS FORT UNION AND MESAVERDE SANDSTONE RESERVOIRS, PICEANCE BASIN, NORTHWESTERN COLORADO,
For primary bibliographic entry see Field 4B.
W77-00637

A STABLE ESTIMATOR FOR LINEAR MODELS: 2. REAL WORLD HYDROLOGIC APPLICATIONS,
Pavia Univ. (Italy).
For primary bibliographic entry see Field 2E.
W77-00640

AN INEXPENSIVE THERMISTOR FLOWMETER FOR AQUATIC BIOLOGY,
Duke Univ., Durham, N. C. Dept. of Zoology.
For primary bibliographic entry see Field 7B.
W77-00645

SEASONAL SNOW ACCUMULATION, MELT AND WATER INPUT--A NEW ENGLAND MODEL,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
For primary bibliographic entry see Field 2A.
W77-00646

IMPROVING THE QUALITY OF WATER RELEASES FROM RESERVOIRS BY MEANS OF A LARGE DIAMETER PUMP,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W77-00668

THE PARTICIPATION OF NEW YORK COMMUNITIES IN THE FEDERAL FLOOD INSURANCE PROGRAM,
Cornell Univ. Agricultural Experiment Station, Ithaca, N.Y. Dept. of Rural Sociology.
For primary bibliographic entry see Field 6F.
W77-00671

A TALE OF TWO CITIES: FLOOD HISTORY AND THE PROPHETIC PAST OF RAPID CITY,
Waikato Univ., Hamilton (New Zealand).
For primary bibliographic entry see Field 6F.
W77-00706

THE BIOLOGICAL CONTROL OF ALLIGATORWEED,
Agricultural Research Service, Gainesville, Fla. Biological Control Lab.
For primary bibliographic entry see Field 5G.
W77-00714

CROWN STRUCTURE AND DISTRIBUTION OF BIOMASS IN A LODGEPOLE PINE STAND,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2I.
W77-00729

THE ENVIRONMENTAL IMPACT OF A LARGE TROPICAL RESERVOIR: GUIDELINES FOR POLICY AND PLANNING. BASED UPON A CASE STUDY OF LAKE VOLTA, GHANA, IN 1973 AND 1974,
Smithsonian Institution, Washington, D. C.
For primary bibliographic entry see Field 6G.

W77-00767

PLANNING FOR STORM WATER MANAGEMENT,
Watkins (G. Reynolds) Consulting Engineers, Inc., Lexington, Ky.
For primary bibliographic entry see Field 6F.
W77-00770

CONTRACTING FOR SOCIAL IMPACT ASSESSMENT,
For primary bibliographic entry see Field 6G.
W77-00771

A REPORT TO THE NEW ENGLAND RIVER BASIN COMMISSION ON OUTDOOR RECREATION WITH APPLICATION TO THE SUPPLEMENTAL FLOOD MANAGEMENT STUDY OF THE COMPREHENSIVE WATER AND RELATED LAND RESOURCES INVESTIGATION OF THE CONNECTICUT RIVER BASIN. PART V. RECREATION,
Bureau of Outdoor Recreation, Philadelphia, Pa. Northeast Regional Office.
For primary bibliographic entry see Field 6B.
W77-00772

GUIDE PLAN REPORT, ANDROSCOGGIN RIVER BASIN, MAINE AND NEW HAMPSHIRE, REGIONAL AND INTERSTATE OVERVIEW.
New England River Basins Commission, Boston, Mass.
For primary bibliographic entry see Field 6B.
W77-00774

RESERVOIR SEDIMENTATION ASSOCIATED WITH CATCHMENT ATTRIBUTES, LANDSLIDE POTENTIAL, GEOLOGIC FAULT, AND SOIL CHARACTERISTICS,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2J.
W77-00779

ENTRENCHMENT OF DRAINAGE SYSTEMS IN WESTERN IOWA AND NORTHWESTERN MISSOURI,
Agricultural Research Service, Columbia, Mo.
For primary bibliographic entry see Field 2J.
W77-00831

CHANNEL CHANGES PRODUCED BY THE 1973 FLOOD ON THE LOWER MISSISSIPPI RIVER,
Army Engineer District, Vicksburg, Miss. Potamology Section.
For primary bibliographic entry see Field 2J.
W77-00833

WATER USE ON RANGELANDS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 3B.
W77-00846

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART II. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME 2. BASINS FROM ARROYO GRANDE TO OREGON STATE LINE EXCEPT CENTRAL VALLEY.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W77-00857

HISTORY OF IRRIGATION AND CHARACTERISTICS OF STREAMFLOW IN NEBRASKA PART OF THE NORTH AND SOUTH PLATTE RIVER BASINS,
Geological Survey, Lincoln, Nebr.
For primary bibliographic entry see Field 2E.
W77-00859

EFFECT OF SEQUENCE LENGTH N ON THE CHOICE OF ASSUMED DISTRIBUTION OF FLOODS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W77-00861

WATER RESOURCES OF THE WARM SPRINGS INDIAN RESERVATION, OREGON,
Geological Survey Portland, Oreg.
J. H. Robison, and A. Laenen.
Water-Resources Investigations 76-26, 1976. 85 p, 32 fig, 1 plate, 17 tab, 30 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Water quality, Data collections, Aquifer characteristics, Hydrogeology, Water wells, Water yield, Streamflow, Flow rates, Lakes, Chemical analysis, Water utilization, *Oregon.
Identifiers: *Warm Springs Indian Reservation(Oreg).

Water-resources data for the 1,000-square-mile Warm Springs Indian Reservation in north-central Oregon were obtained and evaluated. The area is bounded on the west by the crest of the Cascade Range and on the south and east by the Metolius and Deschutes Rivers. The mountainous western part is underlain by young volcanic rocks, and the plateaus and valleys of the eastern part are underlain by basalt, tuff, sand, and gravel of Tertiary and Quaternary ages. There are numerous springs, some developed for stock use, and about 50 domestic and community wells; yields are small, ranging from less than 1 to as much as 25 gallons per minute. Chemical quality of most ground water is suitable for stock or human consumption and for irrigation. Average flows of the Warm Springs River, Metolius River, and Deschutes River are 440, 1,400, and 4,040 cubic feet per second (cfs), respectively. Shitike Creek, which has an average flow of 108 cfs had a peak of 4,000 cfs in January 1974. Most streams have fewer than 100 milligrams per liter (mg/liter) of dissolved solids. Chemical and biological quality of the mountain lakes is also good; of 10 lakes studied, all had fewer than 50 mg/liter of dissolved solids and none had measurable fecal coliform bacteria. (Woodard-USGS)
W77-00864

EFFECTS OF CHANGES IN AN ALLUVIAL CHANNEL ON THE TIMING, MAGNITUDE, AND TRANSFORMATION OF FLOOD WAVES, SOUTHEASTERN ARIZONA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2E.
W77-00869

FLOOD-PLAIN DELINEATION FOR CAMERON RUN BASIN, FAIRFAX COUNTY--ALEXANDRIA CITY, VIRGINIA,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W77-00870

FLOOD PLAIN MANAGEMENT ALTERNATIVES IN THE MAITLAND AREA (AUSTRALIA),
New South Wales Univ., Kensington (Australia).
G. M. Folie, R. Henderson, D. T. Howell, and G. D. McColl.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 1-4, June 1976. 4 ref.

Descriptors: *Flood plains, *Flood control, *Non-structural alternatives, *Australia, Flood plain zoning, Flood plain insurance, Land use, Planning, Regional development, Cost-benefit analysis.
Identifiers: *Flood plain management, Maitland(N.S.W.), Hunter River(N.S.W.).

A flood plain management system is described which has been progressively developed over the last twenty years by the New South Wales Public Works Department on the Hunter River in the vicinity of Maitland. The system is a combination of structural and non-structural measures including spillways, floodways, levee banks and flood plain zoning. The system is still being developed with the non-structural measures being refined. All the measures so far included are reviewed, and the system is evaluated in terms of economic efficiency, regional economic impact, environmental impact, and social well-being, and alternatives are considered. The future possible inclusion of flood plain insurance is discussed. Future possibilities in other flood plain management systems are reviewed in the light of the performance of this system. (CSIRO)
W77-00932

DEVELOPMENT OF FLOOD PLAIN MANAGEMENT FOR FORT COLLINS, COLORADO - A CASE STUDY OF U.S. PRACTICE,
New South Wales Univ., Kensington (Australia). Dept. of Civil Engineering.
D. H. Pilgrim, and R. A. Burns.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 5 - 9, June 1976. 11 ref.

Descriptors: *Flood plain zoning, *Flood plain insurance, *Flood protection, *Colorado, Flood plains, Non-structural alternatives, River basin development, Planning, *Australia.
Identifiers: *Fort Collins(Colo), *Flood plain management.

Development of flood plain regulations for Fort Collins, Colorado, is described as a case study of the practical application of the national programme of flood plain management that has been developed in the U.S. over the last ten years. Hydrological, hydraulic and mapping studies are outlined, and features of the regulations described. Problems encountered and approaches used in development and implementation of the regulations are emphasised. The role of public participation is discussed. The experience of communities such as Fort Collins should provide considerable help in the development of flood mitigation programmes in Australia. (CSIRO)
W77-00933

FLOOD MITIGATION STRATEGIES: THE ROLE OF INSURANCE AND STRUCTURAL MEASURES,
New South Wales Dept. of Agriculture, Sydney (Australia).
For primary bibliographic entry see Field 6F.
W77-00934

FLOOD STANDARDS - THE ROLE OF ENGINEERING INSTITUTIONS,
Binnie and Partners, Melbourne (Australia).
For primary bibliographic entry see Field 6F.
W77-00935

FREQUENCY ANALYSIS OF FLOOD DATA IN QUEENSLAND (AUSTRALIA),
Department of Primary Industries, Brisbane (Australia).
R. A. Kopittke, B. J. Stewart, and K. S. Tickle.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 20 - 24, June 1976. 1 fig., 10 tab, 9 ref.

Descriptors: *Flood frequency, *Frequency analysis, Distribution patterns, Flood forecasting, *Australia.
Identifiers: *Queensland.

Flood frequency distributions are tested for their goodness-of-fit and prediction abilities. The normal, Pearson, log-Pearson, Boughton empirical, Gumbel, log-Gumbel, Potter, log-Potter, and Weibull distributions were fitted to the annual series of flood discharges for 42 gauging stations situated mainly in eastern Queensland. Goodness-of-fit tests were applied. The data were split in half on an alternate year basis, and the various distributions applied to the halves. Prediction tests (accuracy and consistency) were then applied to these distributions. All of the results are presented in tabular form. Analysis of the results showed that the log-Pearson and the Boughton empirical distributions gave the best overall results. (CSIRO)
W77-00936

WATER RESOURCE EVALUATION USING PHOTOGRAMMETRIC AND REMOTE SENSING TECHNIQUES,
Laurie, Montgomerie and Pettit Ltd., Sydney (Australia).
P. R. Pettit.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 25 - 29, June 1976. 1 fig., 3 tab, 6 ref.

Descriptors: *Remote sensing, *Photogrammetry, *Satellites(Artificial), Mapping, Water resources, Flood plains.

Various airborne remote sensing techniques are described. The use of conventional photography, frequently enhanced by the use of natural or false colour for interpretive and photogrammetric purposes, will continue to be the principal remote sensing method used in water resources evaluation. The development of satellites, such as LANDSAT, which cover the earth's surface on a regular, repetitive pattern recording a variety of features, will become of increasing importance. The multi-band imagery produced may be used to present pictorial display or, alternatively, may be analysed using computer techniques. Satellites also provide a useful means of collecting and transmitting information from a large number of ground-based stations. Techniques used in flood plain mapping are emphasised. (CSIRO)
W77-00937

STATISTICS: WHEN WILL WE EVER LEARN,
Queensland Irrigation and Water Supply Commission, Brisbane (Australia). Surface Water Resources Branch.
For primary bibliographic entry see Field 7C.
W77-00938

COMPARISON OF SYSTEMS AND PHYSICAL HYDROLOGY APPROACHES TO HYDROLOGIC MODELLING,
Wollongong Univ. Coll. (Australia).
For primary bibliographic entry see Field 2A.
W77-00939

A REGIONAL STORMWATER DRAINAGE MODEL,
A. G. Goyen, and A. P. Aitken.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 40 - 44, June 1976. 2 fig., 10 ref.

Descriptors: *Mathematical models, *Storm drains, *Flood routing, *Urban drainage, Rainfall-runoff relationships, Urban hydrology, Urban runoff, Storm runoff, Flood plains.

A model is presented which analyses trunk stormwater systems involving retarding basins, natural storages and natural or artificial channels and pipes for a given storm situation. The model employs a modification of Laurenson's Runoff Routing Model for hydrograph estimation in urban and partly urbanised catchments, a modified version of the Muskingum-Cunge method for channel routing and Pul's method for the level pool routing of flood flows through storages. Hydrographs, water levels within basins, flow velocities and inundation periods are computed at defined points within the catchment. Sufficient data are available from the model to define flood plain reservations. (CSIRO)
W77-00940

THE MATHEMATICAL MODELLING OF RIVERS,
Meteorology Bureau, Brisbane (Australia). Hydrometeorology Section.
For primary bibliographic entry see Field 2E.
W77-00941

FLOOD ENVELOPES AND FREQUENCIES FOR THE BRISBANE RIVER (AUSTRALIA),
Brisbane City Council (Australia). Dept. of Water Supply and Sewerage.
G. Cossins.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 50 - 55, June 1976. 10 fig., 1 tab., 8 ref.

Descriptors: *Flood frequency, *Flood flow, *Model studies, *Australia, Flood plains, Flood data, Flood forecasting, Warning systems, Urban hydrology, Water levels, Cities.
Identifiers: *Brisbane River(Qld.), Brisbane(Qld.), Flood plain management, Flood plain mapping.

As part of a joint Federal, State and Local Government project to establish models for evaluating the economics of flood plain management and flood mitigation schemes for the metropolitan reaches of the Brisbane River, envelopes of the maximum levels attained were simulated for the whole range of damage-producing floods for which corresponding frequencies were also derived. The data collected, the derivation methods employed, and the application of envelopes and frequency distributions to flood plain mapping, flood warning systems and the economics of flood plain management are described. (CSIRO)
W77-00942

A STAGE-DAMAGE CURVE FOR THE BRISBANE RIVER (AUSTRALIA),
Snowy Mountains Engineering Corp., Cooma (Australia).
A. P. Aitken.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 56 - 60, June 1976. 2 fig., 3 tab., 6 ref.

Descriptors: *Flood damage, *Flood stages, *Data collections, Cost-benefit analysis, Flood control, Warning systems, Flood plains, Buildings, *Australia.
Identifiers: *Brisbane River(Qld.), Flood stage-damage curves.

Cost-benefit studies for flood mitigation schemes and flood forecasting systems require an estimate of the river stage-damage curve. The method used to derive this curve for the Brisbane River using data from the January 1974 flood is described. A particular feature of the study was the compilation of a data bank of buildings affected by floods from the Brisbane River. The data bank consisted of essential data describing the location, size and level of over 28,000 buildings. (CSIRO)
W77-00943

OPTIMIZING BENEFITS TO URBAN RESIDENTS OF A TOTAL FLOOD WARNING SYSTEM FOR THE BRISBANE VALLEY (AUSTRALIA),
Bureau of Meteorology, Brisbane (Australia). Hydrometeorology Section.
G. Heatherwick, and A. L. Quinnell.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 61 - 66, June 1976. 2 fig., 3 tab., 19 ref.

Descriptors: *Cost-benefit analysis, *Warning systems, *Flood damage, *Cities, *Australia, Flood protection, Flood control, Flood frequency, Operating costs, Social aspects.
Identifiers: *Brisbane River(Qld.), Brisbane(Qld.), Ipswich(Qld.)

A flood warning system in the Brisbane Valley for the cities of Brisbane and Ipswich is developed using a systems model approach and studied in detail, with particular reference to major components of the system and their functions and relationships. All of the above have an effect on the public response, which is the prime object of a warning system. A cost-benefit ratio has been determined for the system from the analysis of stage-damage, flood frequency and annual operation cost data. (CSIRO)
W7/-00944

CASE STUDY OF EFFECT OF INCREASED URBANISATION ON FLOOD DAMAGE FOR MOGGILL CREEK, BRISBANE (AUSTRALIA),
New South Wales Univ., Kensington (Australia).
For primary bibliographic entry see Field 4C.
W77-00945

HYDROLOGY OF FLOOD MITIGATION MEASURES IN THE PAHANG RIVER BASIN, MALAYSIA - A CASE STUDY,
W. J. Scott, F. M. J. Ribeny, and T. J. Fricke.
In: Hydrology Symposium, Sydney, Australia 1976. The Institution of Engineers Australia, Preprints of Papers, p. 73 - 77, June 1976. 3 fig., 10 ref.

Descriptors: *Large watersheds, *Instrumentation, *Model studies, *Flood plains, Tropical regions, Asia, Regional development, River regulation, Land use, Hydrologic data.
Identifiers: *Malaysia(Pahang River), *Flood plain mapping.

The hydrological investigations associated with a large river basin study are described. Establishment and operation of rainfall, streamflow and water level stations was carried out. Analysis of existing and collected data provided inputs to the assessment of flood mitigation works both for river regulation and land use strategies. Catchment modelling on annual, monthly and daily bases was carried out using various techniques. Floodplain mapping to a scale of 1:10,000 was completed over a 3000 sq km area. (CSIRO)
W77-00946

BENEFIT-COST STUDIES IN THE PAHANG RIVER BASIN STUDY (MALAYSIA),
L. R. Brownhall, P. Cassell, and G. G. O'Loughlin.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 78 - 82, June 1976. 4 fig., 4 ref.

Descriptors: *Cost-benefit analysis, *Flood protection, *Flood damage, *Computer models, Tropical regions, Asia, Crops, Rice, Horticultural crops, Cities, Data collections.
Identifiers: *Malaysia(Pahang River), Rubber plantations.

Benefit-cost studies carried out during a study of flooding in the Pahang River Basin in Peninsular Malaysia during 1974-4 are described. These include the collection of flood damage data and esti-

mation of expected future damages, derivation of damage relationships for padi rice, rubber and horticultural crops, studies for urban areas and the development of a computer flood damage simulation model. The recommendations of the study are outlined. (CSIRO)
W77-00947

STATISTICAL SENSITIVITY OF PARAMETERS IN A RAINFALL-RUNOFF MODEL,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W77-00948

DEVELOPMENT OF A CONTINUOUS URBAN RAINFALL-RUNOFF MODEL,
Monash Univ., Clayton (Australia).
For primary bibliographic entry see Field 2A.
W77-00949

KINEMATIC WAVE THEORY APPLIED TO STORMFLOW FROM A MOUNTAIN CATCHMENT,
Melbourne and Metropolitan Board of Works (Australia).
For primary bibliographic entry see Field 4C.
W77-00950

THE APPLICATION OF THE SACRAMENTO RAINFALL MODEL TO A LARGE ARID CATCHMENT IN WESTERN AUSTRALIA,
Snowy Mountains Engineering Corp., Cooma (Australia).
For primary bibliographic entry see Field 2A.
W77-00951

STORM RUNOFF ROUTING TO A TIDAL OUTFALL: A CASE STUDY,
N. Rich, B. J. Leplastrier, and E. S. Webber.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 103 - 107, June 1976. 6 fig., 3 tab., 12 ref.

Descriptors: *Storm drains, *Flood routing, *Tidal waters, *Design criteria, *Outlets, *Australia, Urban drainage, Storm runoff, Unit hydrographs, Drainage systems, Water level fluctuations, Open channel flow, Water storage, Cities, Bays.
Identifiers: *Botany Bay(NSW), Sydney(NSW).

Foreshore reclamation at Botany Bay, Sydney (Australia) involved extending two unformed urban stormwater drains to a tidal outfall through a combined channel. The design was required to minimise backwater flooding in low-lying land immediately upstream of the existing outlets. Subcatchment input hydrographs were prepared for various storm durations using temporal rainfall distribution, and the hydrographs were routed through the channel system using an open channel transient flow programme, based on the method of characteristics, which allowed for relative temporal variation between the various input hydrographs and the tide cycle. The results facilitated economic design by identifying critical sections of the channel system. Channel storage effects were found to be significant; and the use of temporal rainfall patterns was found to give higher hydrograph peaks than the use of uniform rainfall intensity, particularly for longer duration storms. (CSIRO)
W77-00952

AN 'ENVIRONMENTAL' APPROACH TO STORMWATER MANAGEMENT IN THE ADELAIDE HILLS (AUSTRALIA),
South Australian Inst. of Tech., Adelaide.
J. R. Argue.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 108 - 112, June 1976. 3 fig., 14 ref.

Descriptors: *Urban drainage, *Suburban areas, *Design criteria, *Australia, Storm runoff, Urbanization, Storm water, Retention.
Identifiers: *Adelaide Hills(SA).

The establishment of urban subdivisions creates increased flooding and erosion of natural channels downstream: this problem is solved, conventionally, by straightening, widening or lining such channels. A less costly and more environmentally acceptable solution is to control runoff within subdivisions so that peak outflowing discharges differ little from those prior to development. This approach, using retention basins for temporary storage of stormwater, is examined for the case of urban subdivisions in the Adelaide hills. The study presents technical information which simplifies the joint tasks of site selection and preliminary design of the retention basins. (CSIRO)
W77-00953

THE NATION'S INCREASING VULNERABILITY TO FLOOD CATASTROPHE,
For primary bibliographic entry see Field 6F.
W77-00961

FLOODPLAIN MANAGEMENT: THE IOWA EXPERIENCE,
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 6F.
W77-00962

THE HEAT BALANCE IN THE FOREST-STEPPE MESOPHILIC DECIDUOUS HIGH OAK FOREST 'LES NA VORSKLE' UNDER ABNORMAL WEATHER CONDITIONS, (IN RUSSIAN),
Leningrad State Univ. (USSR).
For primary bibliographic entry see Field 2I.
W77-00964

WIND EROSION OF SAND AND MEASURES FOR RECLAMATION IN THE ZONE OF THE KARA KUM CANAL, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
For primary bibliographic entry see Field 4D.
W77-00970

PIANC,
National Water Resources Association, Washington, D. C.
For primary bibliographic entry see Field 6E.
W77-00976

BOUNDARIES OF ARID REGIONS, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
For primary bibliographic entry see Field 7C.
W77-01032

ANTHROPOGENIC MORPHOGENESIS OF THE RELIEF OF THE LOWER DON, (IN RUSSIAN),
Rostov-on-Don State Univ. (USSR).
For primary bibliographic entry see Field 2H.
W77-01039

ARK-MO FARMS, INC. V. UNITED STATES (PROBLEM OF PROOF IN RECOVERING FOR FLOOD DAMAGE TO CROPS).
For primary bibliographic entry see Field 3F.
W77-01050

4B. Groundwater Management

HYGIENIC PROBLEMS OF THE FORMATION AND PREDICTION OF CHANGES OF GROUNDWATER QUALITY IN THE CASE OF RECHARGING FROM SURFACE WATER SOURCES, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 5B.
W77-00528

INFILTRATION LAGOONS FOR TERTIARY TREATMENT OF STABILIZATION POND EFFLUENT,
South Dakota State University, Brookings. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-00540

WATER ZONING - TOOL FOR GROUNDWATER BASIN MANAGERS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 6F.
W77-00552

PHYSICAL FUNDAMENTALS OF THE MIXING OF SOLUTIONS OF POLLUTANTS AND SEWAGE IN POROUS MEDIA,
Gesellschaft fuer Strahlen- und Umweltforschung m.b.h., Neuherberg bei Munich (West Germany). Institut fuer Radiohydrometrie.
For primary bibliographic entry see Field 5B.
W77-00554

ITERATIVE METHOD OF DETERMINING AQUIFER CONSTANTS,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W77-00555

EVALUATING POLLUTION-PRONE STRATA BENEATH SEWAGE LAGOONS,
For primary bibliographic entry see Field 5D.
W77-00599

WASTEWATER RECLAMATION PROJECT, ST. CROIX, U.S. VIRGIN ISLANDS,
Black, Crow and Eidsness, Inc. Gainesville, Fla.
For primary bibliographic entry see Field 5D.
W77-00630

MODELING OF NONCONTINUOUS FORT UNION AND MESAVERDE SANDSTONE RESERVOIRS, PICEANCE BASIN, NORTHWESTERN COLORADO,
C. F. Knutson.
Society of Petroleum Engineers Journal, Vol. 16, No. 4, p 175-188, August 1976. 17 fig, 7 tab, 27 ref, 2 append.

Descriptors: *Model studies, *Natural gas, *Colorado, *Rocky Mountain region, Permeability, Oil reservoirs, Hydrofracturing, Fossil fuel, Sandstones, Deep wells, Statistical models, Drillers logs, Well spacing.
Identifiers: *Random models, *Fort Union sandstone, *Mesaverde sandstone, Channel fill deposits, Point bar deposits, Well stimulation, Length-width-thickness ratios.

A recent Federal Power Commission study indicated up to 600 trillion ft of natural gas in place in the Rocky Mountains in low-permeability Cretaceous and Tertiary nonmarine sandstones. This type of reservoir rock was studied in the surface and subsurface in the Piceance Basin area of northwestern Colorado. The sandstone geometry and orientation were characterized. A 'random in-

tersection' technique was developed that used the geological information to generate a spectrum of reservoir models that may be used to simulate the performance of conventional as well as hydraulically and nuclearly fractured wells. Example reservoir models for fractured wells were compared with reservoir models for nonfractured wells. In general, point-bar sandstones could be simulated by radialmodels and channel-fill sandstones by linear models. In a sequence of channel-fill sandstone with Piceance Basin geometry, an average well was connected to about 18% of the in-place reservoir volume in a 320-acre area. Connected reservoir volumes of greater than 70% in a 320-acre area were calculated for fractured wells with fracture wing dimensions of 2000 ft, with actual values depending on fracture extent and pervasiveness. The percent of connected reservoir volume decreased as well spacing increased. (Visocky-ISWS)
W77-00637

PARAMETER IDENTIFICATION IN AN INHOMOGENEOUS MEDIUM WITH THE FINITE-ELEMENT METHOD,
California Univ., Los Angeles.
For primary bibliographic entry see Field 2F.
W77-00638

HYDROGEOPHYSICAL EQUIVALENCE OF WATER SALINITY, POROSITY AND MATRIX CONDUCTION IN ARENACEOUS AQUIFERS,
National Physical Research Lab., Pretoria (South Africa). Geophysics Div.
For primary bibliographic entry see Field 2F.
W77-00652

ARTIFICIAL RECHARGE IN THE GRAND PRAIRIE, ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Agricultural Engineering.
C. L. Griffis.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 610, Price codes: A02 in paper copy, A01 in microfiche. Agricultural Experiment Station, Fayetteville, Bulletin 810, August 1976. 7 p, 3 fig, 5 tab, 7 ref. OWRT A-020-ARK(2).

Descriptors: *Artificial recharge, Bench scale studies, Runoff, Polyelectrolytes, *Arkansas, Rice, Water supply, Groundwater movement, Water wells, *Water treatment.
Identifiers: Grand Prairie(Ark).

The Grand Prairie is located in east-central Arkansas between the White River and Bayou Meto. The area is primarily agricultural, with rice being one of the major crops. This rice requires a considerable amount (22 inches) of water each year, and most of the water for this purpose is pumped from underground wells. As a result, the supply of water in the water-bearing strata underground is being depleted faster than it is being replaced. For this reason, some means of artificially replinishing the water in the aquifer is needed. Bench-scale tests showed that a sand-filled, gravity-flow recharge well was not suitable for recharging untreated runoff water in the Grand Prairie. A series of studies then was made to search for a low-cost water treatment system. The water treatment techniques studied included the use of alum, cationic and anionic polyelectrolytes, lime, and magnesium hydroxide. In addition, some studies included combinations of two or more of the chemicals, and in one series of tests the sludge formed in one batch of treated water was used as seed material for the next batch. No treatment method was able to clarify the water for a cost less than the target cost of $5 per acre foot. Other sources for recharge water were examined and the most likely candidates were found to be the drainage water from flooded rice fields, and rainwater collected on the fields during the off-season for rice production. Use of the first water source presents problems. The latter possibility is now under study.
W77-00734

WATER RESOURCES OF THE ROCK RIVER WATERSHED, SOUTHWESTERN MINNESOTA,
Geological Survey, St. Paul, Minn.
For primary bibliographic entry see Field 7C.
W77-00848

WATER RESOURCES OF THE ROOT RIVER WATERSHED, SOUTHEASTERN MINNESOTA,
Geological Survey, St. Paul, Minn.
For primary bibliographic entry see Field 7C.
W77-00849

GEOHYDROLOGY OF THE LOWLAND LAKES AREA, ANCHORAGE, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 7C.
W77-00850

GEOHYDROLOGY AND WATER SUPPLY, SHEYMA ISLAND, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 7C.
W77-00851

EVALUATION OF ALTERNATIVE METHODS OF SUPPLEMENTAL RECHARGE BY STORMWATER BASINS ON LONG ISLAND, NEW YORK,
Geological Survey, Albany, N.Y.
D. A. Aronson.
Open-file report 76-470, 1976. 56 p, 9 fig, 4 tab, 23 ref.

Descriptors: *Groundwater recharge, *Artificial recharge, *Reclaimed water, *Storm runoff, *Pit recharge, Methodology, Infiltration, Numerical analysis, Model studies, Design storm, Controlled drainage, Evaluation, *New York, Alternative water use.
Identifiers: *Long Island(NY), Dual-purpose basins.

Many of the more than 2,200 storm-water basins on Long Island, N.Y., having runoff and infiltration characteristics similar to those of a basin studied in North Massapequa are potential sites for returning large volumes of reclaimed water (highly treated waste water) to the ground-water reservoir. By use of a finite-difference method of calculation, formulas were devised to calculate changes in basin storage at various time intervals from the start of storm inflow, with and without addition of reclaimed water. The North Massapequa stormwater basin was the prototype design used to test several methods of water application. Calculations using various infiltration rates, storm durations, and storm-return periods indicate that several methods of applying reclaimed water to stormwater basins on Long Island would be feasible. (Woodard-USGS)
W77-00853

GROUND-WATER LEVELS AND WELL RECORDS FOR DISCONTINUED OBSERVATION WELLS IN IDAHO, 1915-72: PART A,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 7C.
W77-00854

GROUND-WATER LEVELS AND WELL RECORDS FOR DISCONTINUED OBSERVATION WELLS IN IDAHO, 1915-72: PART B,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 7C.
W77-00855

GROUND-WATER LEVELS AND WELL RECORDS FOR DISCONTINUED OBSERVATION WELLS IN IDAHO, 1915-72: PART C,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 7C.
W77-00856

AVAILABILITY OF GROUND WATER IN THE AREA SURROUNDING THE TRIDENT SUBMARINE CONSTRUCTION FACILITY, KITSAP COUNTY, WASHINGTON,
Geological Survey, Tacoma, Wash.
A. J. Hansen, Jr., and D. Molenaar.
Open-File Report 76-351, 1976. 30 p, 15 fig, 5 ref.

Descriptors: *Water resources, *Groundwater availability, *Water demand, *Potential water supply, *Aquifer characteristics, Construction, Sites, Surface waters, Hydrologic data, Saline water intrusion.
Identifiers: *Kitsap County(Wash), Pre-construction survey.

General information is presented on water resources--with emphasis on ground-water occurrence and availability--in that part of Kitsap County (referred to as Trident Impact Area) that would be most affected by the development of the Trident submarine construction facility at Bangor, Washington. The estimated 1970 water use in the study area averaged about 13 million gallons per day (mgd); of this amount about 9 mgd came from surface-water sources--from a large reservoir outside the study area--and about 4 mgd came from ground water pumped from two aquifers in the area. Anticipated water use soon will be about 18 to 21 mgd; virtually all the additional quantity required (about 5 to 8 mgd) above present use must come from ground-water sources. Preliminary evaluation of the aquifers suggests that an additional 1.5 mgd can be developed from the upper aquifer and 7 mgd from the lower aquifer. Existing wells tapping the lower aquifer might yield additional water and increase the total yield in the area by 3.5 mgd, and new wells drilled in selected areas could produce an additional 3.5 mgd from this aquifer. However, additional, large-scale groundwater withdrawal from the lower aquifer could induce saltwater intrusion into wells situated in coastal areas. (Woodard-USGS)
W77-00862

MODEL ANALYSIS OF EFFECTS ON WATER LEVELS AT INDIANA DUNES NATIONAL LAKESHORE CAUSED BY CONSTRUCTION DEWATERING,
Geological Survey, Indianapolis, Ind.
J. R. Marie.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 908/As, Price codes: A03 in paper copy, A01 in microfiche. Water-Resources Investigations 76-82, July 1976. 32 p, 19 fig, 1 tab, 7 ref.

Descriptors: *Computer models, *Dewatering, *Groundwater, *Drawdown, *Surface-groundwater relationships, Aquifer characteristics, Water levels, Ponds, Baseline studies, Construction, Excavation Nuclear powerplants, Sites.
Identifiers: *Indiana Dunes National Lakeshore, Pond-level declines.

The computer models were developed to investigate possible hydrologic effects within the Indiana Dunes National Lakeshore caused by planned dewatering at the adjacent Bailly Nuclear Generator construction site. The model analysis indicated that the planned dewatering would cause a drawdown of about 4 ft under the westernmost pond of the Lakeshore and that this drawdown would cause the pond to go almost dry--less than 0.5 ft of water remaining in about 1 percent of the pond--under average conditions during the 18-month dewatering period. When water levels are below average, as during late July and early August 1974, the pond would go dry in about 5.5

months. However, the pond may not have to go completely dry to damage the ecosystem. If the National Park Service's independent study determines the minimum pond level at which ecosystem damage would be minimized, the models developed in this study could be used to predict the hydrologic conditions necessary to maintain that level. (Woodard-USGS)
W77-00863

WATER RESOURCES OF THE WARM SPRINGS INDIAN RESERVATION, OREGON,
Geological Survey Portland, Oreg.
For primary bibliographic entry see Field 4A.
W77-00864

COMPUTER SIMULATION MODEL OF THE PLEISTOCENE VALLEYFILL AQUIFER IN SOUTHWESTERN ESSEX AND SOUTHEASTERN MORRIS COUNTIES, NEW JERSEY,
Geological Survey, Trenton, N. J.
For primary bibliographic entry see Field 2F.
W77-00865

GEOLOGY AND GROUND-WATER RESOURCES OF CAMDEN COUNTY, NEW JERSEY,
Geological Survey, Trenton, N. J.
For primary bibliographic entry see Field 2F.
W77-00866

INVESTIGATIONS INTO THE VERTICAL DISTRIBUTION OF ORGANISMS AND CHEMICAL SUBSTANCES IN THE GROUNDWATER IN VALLEYS AND TERRACES: METHODS AND FIRST RESULTS, (IN GERMAN),
Max-Planck-Institut fuer Limnologische Schlitz (West Germany). Limnologische Flusstation.
For primary bibliographic entry see Field 5A.
W77-00919

SANITARY AND HYGIENIC EVALUATION OF THE QUALITY OF UNDERGROUND DRINKING WATER, (IN RUSSIAN),
Municipal Sanitary Epidemiology Station, Zhukovskii (USSR)
For primary bibliographic entry see Field 5B.
W77-01023

4C. Effects On Water Of Man's Non-Water Activities

THE IMPACT OF PROPOSED FEDERAL ENERGY DEVELOPMENT ON WESTERN WATER RESOURCES,
In: Energy, Water, and the West,November 2-5, 1975, Albuquerque, p 11-17, May 1976. 5 append.

Descriptors: *Energy, *Future planning(Projected), *Water resources development, *Water requirements, Coals, Oil shales, Human population, Water users, Water demand.
Identifiers: *Western U. S.

Two authors report on projected federal energy development in the west and the impact of energy decision on water use in that region. Almost half of the nation's known coal reserves lie in the western states, with about 60% under federal jurisdiction. Western coal is attractive because of its low sulfur content and easier access in many locations. Planning and development for this resource and for oil shale are discussed. Water demands for conversion of coal are substantial; some possible water sources and their limitations are outlined. Also discussed are the impacts of growth, especially in small communities unprepared for it, and mitigating environmental impacts. Interior Department policies for total water management, coal exporting and intergovernmental cooperation are presented. The Arab influence on energy problems has been substantial, and energy independence requires drawing on western resources. Approximately 2 million acre-feet a year of new water will be needed in the Northern Great Plains and Colorado Basin by 1985. The key issue may be competition between potential users for available water. Government intervention will probably be necessary to manage some of this uneven economic competition. Recommendations for state and local action are outlined. (See also W77-00542) (Jahns-Arizona)
W77-00543

FEDERAL AND STATE GOVERNMENTS, AND THE INDIAN NATIONS: WATER RIGHTS, CONFLICTS, AND POLICIES,
For primary bibliographic entry see Field 6E.
W77-00544

EFFECT OF PRESCRIBED BURNING ON SEDIMENT, WATER YIELD, AND WATER QUALITY FROM DOZED JUNIPER LANDS IN CENTRAL TEXAS,
Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management.
H. A. Wright, F. M. Churchill, and C. S. Stevens.
Journal of Range Management, Vol. 29, No. 4, p 294-298, July, 1976. 2 fig, 4 tab, 32 ref. OWRT C-3191(No 3699)(3), 14-31-0001-3699.

Descriptors: *Sediment discharge, *Water quality, *Runoff, *Turbidity, *Watersheds(Basins), Water management(Applied), Water supply, Seepage, Erosion, Slopes, Burning, *Texas.
Identifiers: *Rainfall frequency, *Rainfall intensity, Central Texas, Limestone-derived soil, *Prescribed burning.

Prescribed burning was applied to six miniwatersheds that were each paired with an unburned watershed on limestone-derived soils in Central Texas. Erosion losses, runoff, and water quality were unaffected on level areas, but adverse effects lasted for 9 to 15 months on moderate slopes (8-20%) and for 15 to 30 or more months on steep slopes (37-61%). Soil losses were 1 ton/acre on 15% slopes and 6 to 8 tons/acre on steep slopes. Rates of erosion losses stabilized within 18 months on all slopes when vegetative cover reached 63 to 68%. Quality of water was soft from level areas, moderately hard for 6 months on 15 to 20% slopes, and moderately hard for 15 to 30 or more months on 45 to 53% slopes. Turbidity stayed above the controls for 1 1/2 years on moderate slopes and for 3 to 4 years on steep slopes. Slopes greater than 20% should not be converted from shrubs to grass and left to heal naturally.
W77-00679

THE INFLUENCE OF LAND USE ON STREAM NUTRIENT LEVELS,
Corvallis Environmental Research Lab., Oreg. Eutrophication Survey Branch.
For primary bibliographic entry see Field 5C.
W77-00725

AIRFLOW PATTERNS AND SNOW ACCUMULATION IN A FOREST CLEARING,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
H. L. Gary.
In: Western Snow Conf. (Coronado, Calif., April 1975) Proc. 43, p 106-113.

Descriptors: *Clear-cutting, *Snow management, Snowmelt, Air circulation, *Snowpacks, Watershed management, *Forest management, Water yield improvement, *Lodgepole pine trees.

Snow accumulation and airflow patterns were measured before and after establishing a clearing 1 tree-height wide and 5 tree-heights long in a lodgepole pine forest. The long axis was normal to prevailing wind. The profile of accumulated snow, less the mean amount of snow upwind of the clearing, was compared with the streamline patterns of airflow. Snow profiles are shown for 2 years where annual accumulation varied by a factor of 2. Snow accumulation was maximum in the clearing and minimum just behind the lee clearing edge. The maximum was centered about the upwind edge of the back eddy of airflow in the clearing. The minimum coincided with the downwind edge of the same eddy. These comparisons suggest that clearings may become saturated similar to snow-fence systems, and that the accumulation pattern reflects primarily wind drift of falling snow rather than subsequent erosion and redeposition. (Forest Service)
W77-00726

EVALUATING IMPACT OF FOREST SITE PREPARATION ON SOIL AND WATER QUALITY IN THE U.S. GULF COASTAL PLAIN,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
For primary bibliographic entry see Field 5B.
W77-00740

EFFECT OF LAND USE ON SEDIMENT DELIVERY RATIOS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 2J.
W77-00777

SEDIMENT YIELD FROM CONSTRUCTION SITES,
MITRE Corp., McLean, Va. Dept. of Environmental Assessment.
R. L. Holberger, and J. B. Truett.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-47 - 1-58, 1976. 1 fig, 3 tab, 16 ref.

Descriptors: *Sediment yield, *Construction, *Model studies, Mathematical studies, Sediments, Erosion, Runoff, Precipitation(Atmospheric), Rainfall, Forecasting, Sediment load, Sediment transport, Soil erosion, Streamflow, Sedimentology.

Two sediment loading functions were fitted to sediment loss data from eight field studies of construction sites. Both were adaptations of the Universal Soil Loss Equation, and involved an empirically-fitted factor to account for effects of intervening terrain between construction site and point of sediment measurement in a nearby watercourse. One function used the distance from the foot of the exposed area to the nearest perrenial stream, while the second function used the percent of the drainage basin undergoing construction. Comparison of predicted sediment yields (in tons/acre) with observed yields indicated that, for the first loading function, about 54% of the predictions fell within a range of + or - 50% of observed values. Approximately 30% of the predictions generated by the second method fell within + or - 50% of the observed values. (See also W77-00775) (Sims-ISWS)
W77-00780

DEBRIS FLOWS FOLLOWING WILDFIRE IN NORTH CENTRAL WASHINGTON,
Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment Station.
G. O. Klock, and J. D. Helvey.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-91 - 1-98, 1976. 1 fig, 4 ref.

Descriptors: *Erosion, *Washington, *Forests, *Forest fires, *Floods, Precipitation(Atmospheric), Precipitation excess, Streams, Streamflow, Flood flow, Wastes, Flash floods, Storm runoff, Sediments, Sedimentation, Alluvial fans, Alluvium, Channels, Channel morphology.
Identifiers: *Debris torrents, *Entiat River, Debris.

A combination of rapid snowmelt, high intensity rainstorms, and fire-denuded watersheds resulted in massive debris torrents from numerous tributary streams of the Entiat River in north-central Washington during the spring and summer of 1972. Debris torrents were summarized by location, soil type, topography, and land use history for five adjacent watersheds. Alternative forest management recommendations were suggested for minimizing the impact of possible future debris torrents within the study area. (See also W77-00775) (Sims-ISWS)
W77-00783

EROSION AND SEDIMENT FROM FOREST LAND USES, MANAGEMENT PRACTICES AND DISTURBANCES IN THE SOUTHEASTERN UNITED STATES,
Forest Service (USDA), Atlanta, Ga. Southeastern Area.
G. E. Dissmeyer.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 1-140 - 1-148, 1976. 1 fig, 5 tab, 2 ref.

Descriptors: *Erosion, *Sediment yield, *Forests, *Southeast U. S., Forest management, Forest watersheds, Forest fires, Sediment discharge, Sediments, Suspended solids, Sedimentation, Water quality, Roads, Grazing, Land use, Storm runoff, Watersheds(Basins).

The data and information presented defines the nature, extent, and magnitude of erosion and sediment sources from several forested river basins in the Southeastern United States. Data showed that not all sediment from forest land is related to silviculture, but in some areas, past abusive agriculture and present woodland overgrazing are the most important sources of sediment. Data also showed that forest practices acts, which contain blanket regulations, are likely to be inappropriate for some areas, insufficient for others, or sometimes unnecessary. It was concluded that control of forest sediment needs to be prescriptive and site specific in nature to meet not only water quality, but other resource needs. (See also W77-00775) (Sims-ISWS)
W77-00787

DEFINING THE SEDIMENT TRAPPING CHARACTERISTICS OF A VEGETATIVE BUFFER. SPECIAL CASE: ROAD EROSION,
Forest Service, Denver, Colo. Rocky Mountain Region.
For primary bibliographic entry see Field 4D.
W77-00799

GEOTECHNICAL MANAGEMENT OF FOREST LANDS IN GRANITIC TERRANE,
Forest Service (USDA), Medford, Oreg. Rogue River National Forest.
B. G. Hicks.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 2-83 - 2-90, 1976. 5 ref.

Descriptors: *Forests, *Forest management, *Lumbering, *Landslides, Rainfall, Erosion, Soil erosion, Road construction, Granites, Weathering, Erosion control, Slopes, Projects, On-site investigations, Mountains.
Identifiers: *Granitic terranes, Granitic rocks.

Weathered granitic rocks have historically created problems for forest land management. Specialists are working to minimize the environmental damage resulting from road construction and logging impacts. Problems result when entry is made into steep granitic terrane with high rainfall where road construction and logging is planned. The damage is largely due to liquefaction type failures which produce greatly accelerated mass wasting as a result of debris landslides and flows. This geotechnical scheme was a unique plan for forest land management which produces a quantitative program for an environmentally safe operation and will yield an economically feasible project. The format of the scheme was: (1) Select a granitic area with stability problems, prepare detailed topographic map and obtain color and color infrared photography. (2) Hydrologic monitoring. (3) Engineering geologic study: mapping, drilling, sampling, geophysical surveys, field testing for stability parameters. (4) Soil engineering: lab and model test representative samples and compute stability parameters. (5) Correlate field properties with lab and model tests. (6) Prepare stability unit map. (7) Develop logging and road construction project using stability map and road design data. (See also W77-00775) (Sims-ISWS)
W77-00800

TECHNIQUES OF RESEARCHING INFORMATION FOR THE DEVELOPMENT OF A MANUAL TO VEGETATE SOILS OF LOW PRODUCTIVITY DISTURBED BY CONSTRUCTION ACTIVITIES,
Midwest Research Inst. Kansas City, Mo.
For primary bibliographic entry see Field 4D.
W77-00805

CONTROL OF TURBIDITY AT CONSTRUCTION SITES,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 4D.
W77-00808

NUTRIENTS LOST IN DEBRIS AND RUNOFF WATER FROM A BURNED CHAPARRAL WATERSHED,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
L. F. DeBano, and C. E. Conrad.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 3-13 - 3-27, 1976. 1 fig, 4 tab, 24 ref.

Descriptors: *Nutrient removal, *Runoff, *Erosion, *California, Nutrients, Chaparral, Burning, Slopes, Litter, Watersheds(Basins), Nitrogen, Phosphorus, Calcium, Magnesium, Sodium, Potassium, Chemistry, On-site investigations, laboratory tests, Water quality.
Identifiers: *Prescribed burning, Nutrient loss.

Runoff water and movement of debris were measured on a chaparral-covered watershed, in southern California, that was prescribe-burned in summer 1973. Plant nutrients in the runoff water and debris during the first rainy season were analyzed. The amounts of N, P, Ca, Mg, K, and Na in the soil, litter, and plant material after burning, but before erosion occurred, were measured. In the first year, an area with 50% slopes had about 7300 kg/ha (6300 lb/ac) of material eroded from the plots on the burned sites as compared to only 210 kg/ha (187 lb/ac) on similar unburned sites. On the burned area, less debris was lost from the plots having 20% slopes than from those on steeper sites. No erosion occurred on unburned slopes with a 20% slope. The total amount of nutrients lost in debris and runoff water from the steep slopes that burned, in kg/ha (lb/ac), were: nitrogen--15.1 (13.5); phosphorus--3.4 (3.0); potassium--27 (24.1); magnesium--31.6 (28.2): calcium--67.4 (60.2); and sodium--4.6 (4.1). Nutrients lost represented less than 6% of the total nutrients found in the upper 2 cm (0.79 in) of the soil and litter layer immediately after the fire. (See also W77-00775) (Sims-ISWS)
W77-00810

SEDIMENT RUNOFF DURING HIGHWAY CONSTRUCTION,
Geological Survey, Harrisburg, Pa.
W. G. Weber, Jr., and L. A. Reed.
Reprint from Civil Engineering--ASCE, March 1976: ASCE Irrigation and Specialty Conference in Ottawa, Canada, July 1976. 4 p, 4 fig, 1 tab.

Descriptors: *Sediment control, *Road construction, *Pennsylvania, Highways, Sediment transport, Retaining walls, Ponds, Vegetation, Watersheds(Basins), Erosion control, Methodology, Evaluation.
Identifiers: *Harrisburg area(Pa), Interstate-81 Construction(Pa).

The Pennsylvania Department of Transportation and Environmental Resources (State Conservation Commission) and the U.S. Geological Survey are cooperating in a field study to determine the effectiveness of various erosion-control measures during highway construction on I-81. Hydrologic parameters including water and sediment flow are being monitored in five adjacent watersheds near Harrisburg, Pa. Different types of erosion control measures are being used in each watershed to prevent soil exposed by the construction activity from entering the stream system. The area under active construction correlates well with the sediment load transported by the streams. The onsite holding devices, such as off-stream ponds appear to be the most effective method of sediment control on this project. Seeding and mulching have a minor effect on sediment production until vegetative growth is well established. The placing of the subbase had a major effect on sediment production due to the large exposed area involved. (Woodard-USGS)
W77-00847

GEOHYDROLOGY OF THE LOWLAND LAKES AREA, ANCHORAGE, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 7C.
W77-00850

FLOOD-PLAIN DELINEATION FOR CAMERON RUN BASIN, FAIRFAX COUNTY--ALEXANDRIA CITY, VIRGINIA,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W77-00870

AN ECONOMIC ANALYSIS OF THE ENVIRONMENTAL IMPACT OF HIGHWAY DEICING,
Abt Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5C.
W77-00923

CASE STUDY OF EFFECT OF INCREASED URBANISATION ON FLOOD DAMAGE FOR MOGGILL CREEK, BRISBANE (AUSTRALIA),
New South Wales Univ., Kensington (Australia).
C. H. Munro.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 67 - 72, June 1976. 1 tab, 20 ref.

Descriptors: *Urbanisation, *Flood discharge, *Flood damage, *Australia, Suburban areas, Peak discharge.
Identifiers: *Brisbane(Qld.), Moggill Creek(Qld.).

The effect of increased urbanisation of metropolitan suburbs on flood discharges is

discussed, and a case study is presented for Moggill Creek, a tributary of the Brisbane River, with some reference to Breakfast Creek and Kedron Brook. Based on three procedures reported in U.S. literature, the conclusion of the study is that an increase in urbanisation rendering up to 20% of the catchment impervious causes only small increases in peak flood discharges, peak flood levels and average annual flood damage estimates. The outer suburbs of Brisbane are considered to be such that this percentage of impervious surface would rarely be exceeded. (CSIRO)
W77-00945

KINEMATIC WAVE THEORY APPLIED TO STORMFLOW FROM A MOUNTAIN CATCHMENT,
Melbourne and Metropolitan Board of Works (Australia).
K. J. Langford.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 93 - 97, June 1976. 8 fig., 9 ref.

Descriptors: *Forest watersheds, *Mathematical models, *Rainfall-runoff relationships, *Mountain forests, Storm runoff, Hydrographs, Streamflow forecasting, Forest management, Clear-Cutting, Vegetation effects.
Identifiers: *Kinematic wave theory.

Development and preliminary testing of a model, based on kinematic wave equations, for calculating stormflow hydrographs for steep mountain catchments, and particularly to assist in detecting changes due to clearfelling and other forest operations, is described. Simplifying assumptions were made to reduce the number of parameters to three: a rainfall intensity scale, a constant loss rate, and a measure of channel conveyance. A system of scaling was developed to reduce the amount of computation characteristic of kinematic wave theory; a full set of integrations need only be done for each level of loss rate, hydrographs for any combination of the other parameters can be obtained by adjusting the distance and streamflow concentration scales. Calculation of hydrographs for a simple constant intensity storm illustrate the basic properties of the model, and a preliminary test application to a hydrograph from an experimental catchment is described. (CSIRO)
W77-00950

MAN'S EFFECT ON THE QUALITY OF OUR WATER,
Central and Southern Florida Control District, West Palm Beach.
For primary bibliographic entry see Field 5C.
W77-00974

4D. Watershed Protection

URBAN SEDIMENT PROBLEMS: A STATEMENT ON SCOPE, RESEARCH, LEGISLATION, AND EDUCATION.
American Society of Civil Engineers, New York. Task Committee on Urban Sedimentation Problems.
For primary bibliographic entry see Field 5B.
W77-00556

MUNICIPAL WATERSHED MANAGEMENT SURVEY,
Southeastern Area State and Private Forestry, Atlanta, Ga.; and Geological Survey, Atlanta, Ga.
For primary bibliographic entry see Field 5B.
W77-00608

(WATERSHED MANAGEMENT AND DECISION MAKING IN RELATION TO COMPUTER HARDWARE, COMMUNICATIONS AND SOFTWARE DESIGN),
Hydrocomp, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 7C.
W77-00619

EFFECT OF PRESCRIBED BURNING ON SEDIMENT, WATER YIELD, AND WATER QUALITY FROM DOZED JUNIPER LANDS IN CENTRAL TEXAS,
Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management.
For primary bibliographic entry see Field 4C.
W77-00679

A REGIONAL PLANNING APPROACH TO THE FLOODPLAIN MANAGEMENT PROBLEM,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6F.
W77-00704

SUBMERGED BURLAP STRIPS AIDED REHABILITATION OF DISTURBED SEMIARID SITES IN COLORADO AND NEW MEXICO,
Forest Service (USDA), Tempe, Ariz. Rocky Mountain Forest and Range Experiment Station.
B. H. Heede.
USDA Forest Service Research Note, RM-302, December 1975. 8 p., 8 fig., 1 tab., 2 ref.

Descriptors: *Erosion control, *Bank stabilization, *Grassed waterways, *Channel improvement, *Flow control, Gully erosion, Rill erosion, Mountain slopes, Ephemeral streams, Colorado, New Mexico, Rocky Mountain region.
Identifiers: Mechanical erosion control, Colorado Rocky Mountains, New Mexico Gila Mountains.

Two planting sites with narrow submerged burlap strips showed 14 times less soil loss than control sites without burlap. Gullies and deep rills need to be reshaped to gentle swales before burlap is installed. Plant cover should become established before burlap disintegrates--about 5 years. (Forest Service)
W77-00727

MOUNTAIN WATERSHEDS AND DYNAMIC EQUILIBRIUM,
Forest Service (USDA), Tempe, Ariz. Rocky Mountain Forest and Range Experiment Station.
B. H. Heede.
In: Watershed Management. Proceedings of Symposium by Irrigation and Drainage Division, ASCE, August 11-13, 1975, Logan, Utah, p. 407-420, 4 fig., 4 ref.

Descriptors: *Geomorphology, *Watersheds(Basins), *Channel morphology, Streamflow, Ephemeral streams, Perennial streams, Sediment load, *Watershed management, *Equilibrium, Colorado, Rocky Mountain region, Land development.
Identifiers: *Landform development, Channel nickpoints, Dynamic equilibrium, Longitudinal stream profile, Fraser Experimental Forest, Arizona White Mountains.

Watersheds represent an important landform. Knowledge of their stage of development tells about future watershed behavior. This is critical for watershed management because man may enhance or hinder future natural processes. Dynamic characteristics of two perennial and two ephemeral mountain streams revealed that the former are in a state of dynamic equilibrium, while the latter are still working toward its attainment. Bed characteristics indicated that both aim at adjustment to slope by formation of rock and log bars. Thus, the surrounding forest plays an active role in stream hydraulics. (Forest Service)
W77-00728

EVALUATING IMPACT OF FOREST SITE PREPARATION ON SOIL AND WATER QUALITY IN THE U.S. GULF COASTAL PLAIN,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
For primary bibliographic entry see Field 5B.
W77-00740

ENVIRONMENTAL MANAGEMENT IN THE MALIBU WATERSHED: INSTITUTIONAL FRAMEWORK,
California Univ., Los Angeles. School of Architecture and Urban Planning.
For primary bibliographic entry see Field 6G.
W77-00769

PROCEEDINGS OF THE THIRD FEDERAL INTER-AGENCY SEDIMENTATION CONFERENCE 1976.
Water Resources Council, Washington, D.C. Sedimentation Committee.
For primary bibliographic entry see Field 2J.
W77-00775

WATERSHED EROSION MODEL VALIDATION FOR SOUTHWEST IOWA,
Agricultural Research Service, Morris, Minn. North Central Soil Conservation Research Center.
C. A. Onstad, R. F. Piest, and K. E. Saxton.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-22 - 1-34, 1976. 3 fig, 5 tab, 8 ref.

Descriptors: *Erosion, *Watersheds(Basins), *Model studies, *Iowa, Mathematical models, Sediments, Sedimentation, Sediment yield, Soil erosion, Runoff, Rainfall, Precipitation(Atmospheric).

Watershed erosion data from two Agricultural Research Service watersheds near Treynor, Iowa were used to test an erosion model developed by Onstad and Foster. This model utilized a distributed set of input variables and included a detachment and a transport phase. Depending on the magnitude of each phase, soil was either eroded or deposited. Predicted sediment yields from sheet-rill sources were compared with measured yields for single events and with predictions by the universal soil loss equation developed by Wischmeier and Smith and the Williams model. A sensitivity analysis was performed for the fitted parameter in the Onstad-Foster model. Confidence intervals were also calculated for a wide range of single-event sediment yields. These results showed that the Onstad-Foster model performed better than the other two models for the storms tested. (See also W77-00775) (Sims-ISWS)
W77-00778

SEDIMENT SOURCES AND YIELDS FROM SAGEBRUSH RANGELAND WATERSHEDS,
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
C. W. Johnson, and C. L. Hanson.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-71 - 1-80, 1976. 1 fig, 4 tab, 11 ref.

Descriptors: *Sediment yield, *Runoff, *Ranges, *Watersheds(Basins), *Idaho, Sediments, Suspended solids, Bed load, Bed load samplers, Weirs, On-site investigations, Surveys, Rainfall, Precipitation(Atmospheric), Drainage, Model studies, Mathematical models, Sedimentology.
Identifiers: *Reynolds Creek Watershed(Idaho).

Average sediment yields from the Reynolds Creek Experimental Watershed and three subwatersheds ranged from 1.14 to 1.90 tonnes/ha/year (0.51 to

0.85 tons/ac/year) during the study period. Yields were more than tenfold higher in wet than in dry years, and about 90% of average yearly yield occurred during January, February, and March at the Reynolds Outlet Station. Sediment yields from six upland source areas, 0.9 to 83 ha (2.25 to 205 acres), were one-third or less per unit area than those from larger downstream watersheds. Bedload transport data collected by use of Helley-Smith bedload samplers showed that bedload averaged about 20% of total sediment yield. Analysis of runoff-sediment events by parameter optimization showed excellent correlation between suspended sediment volume and combined peak flow and runoff volume. The procedure should be useful in predicting sediment yields from similar areas having a minimum of sediment data. (See also W77-00775) (Sims-ISWS)
W77-00781

SEDIMENT YIELDS FROM A MISSISSIPPI DELTA WATERSHED,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
C. E. Murphree, C. K. Mutchler, and L. L. McDowell.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-99 - 1-109, 1976. 3 fig, 2 tab, 7 ref.

Descriptors: *Sediment yields, *Runoff, *Farm management, *Mississippi, Rainfall, Precipitation(Atmospheric), Sediments, Clays, Silts, Crops, Cotton, Agriculture, Erosion, Agricultural chemicals, Herbicides, Pollutants, Regression analysis, Soil erosion, Agricultural runoff, Sedimentation.

Runoff and sediment yield were measured on a Mississippi Delta watershed, land-formed to 0.2% slope, and farmed in continuous cotton. Interest in sediment yields and hydrology of the flatland watersheds of the Lower Mississippi River Valley or Delta (as it is commonly known) had increased greatly due, primarily, to the concern that agricultural chemicals may be transported into streams and lakes by sediment and runoff waters from farmlands. However, sediment yields indicated a serious erosion problem; 28.98 MT/ha/year (12.93 tons/acre/year) were lost from a 15.58-ha (38.5-acre) watershed during a 2-year period. Because rainfall in these 2 years was extremely high (33% above the 17-year average), long-term average annual sediment yield values should be lower. (See also W77-00775) (Sims-ISWS)
W77-00784

SIMULATING EROSION DYNAMICS WITH A DETERMINISTIC DISTRIBUTED WATERSHED MODEL,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
R. E. Smith.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-163 - 1-173, 1976. 5 fig, 15 ref.

Descriptors: *Erosion, *Model studies, *Watersheds(Basins), Mathematical models, Flow, Equations, Streamflow, Precipitation(Atmospheric), Rainfall, Hydraulics, Kinetics, Runoff, Mathematical studies, Suspended solids, Sediments, Sediment yield, Infiltration, Pollutants.
Identifiers: Differential equations.

A simulation model was described which incorporated the differential equation for continuity of suspended sediment into a kinematic numerical model for hydraulic response of a watershed surface. The model was practical since it included an advanced infiltration function and had the ability to accept complex rainfall patterns. The structure of the model allowed the simulation of relatively complex watershed shapes using a watershed composed of small branched channels fed by an arrangement of non-rectangular, converging planes with distorted slopes. The realism of the model's ability to simulate sediment production was limited by the necessity to specify rather empirical functions for soil detachment rates from rainfall impact and from flowing water. It was learned that either tractictive force or stream power function may be chosen as a model for sediment-carrying capacity. Several examples were shown to demonstrate the capabilities of such a dynamic and distributed simulation of watershed sediment production, including effects on erosion of rainfall patterns, slope convergence, and comparative sediment-production rainfall, overland flow, and channel flow. (See also W77-00775) (Sims-ISWS)
W77-00788

SEDIMENTATION OF A FLATLAND WATERSHED IN LOUISIANA,
Soil Conservation Service, Alexandria, La. Watershed Planning and River Basin Studies.
C. R. Akers.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 1-174 - 1-180, 1976. 1 fig, 7 ref.

Descriptors: *Sedimentation, *Watersheds(Basins), *Louisiana, *Mississippi River, Marshes, Levees, Bayous, Runoff, Erosion, Suspended solids, Sediments, Sampling, Rainfall, Simulated rainfall, Soils, Soil erosion, Sheet erosion, Sediment yield, Agricultural runoff, Sedimentology.
Identifiers: *Bayou Fafourche(La).

Recent emphasis on the downstream effects of the Public Law 566 flatland watersheds has created an additional need to examine the various aspects of the sedimentary process in areas of low relief. Presently accepted evaluation procedures were developed in areas of greater relief and generally dealt with coarser soils. The data for evaluation described here was a joint effort between the Agricultural Research Service (ARS), the United States Geological Survey (USGS), and the Soil Conservation Service (SCS). Each group has unique expertise, and the coalition of this expertise is expected to furnish the maximum knowledge in minimum time at minimum expense. Basic sheet erosion was determined by ARS using a 'rainfall simulator.' Sediment in transport was measured by USGS using PS-69 samplers. Rates of sediment deposition were measured by ARS using Cesium-137 concentrations as date markers. SCS monitored activities that affect the land, providing personnel in the immediate area, correllating activities dealing with the study, analyzing results of the various studies, and evaluating the elements of the sedimentary process. (See also W77-00775) (Sims-ISWS)
W77-00789

WATER AND SEDIMENT ROUTING FROM SMALL WATERSHEDS,
Colorado State Univ., Fort Collins, Dept. of Civil Engineering.
R-M. Li, M. A. Stevens, and D. B. Simons.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 1-193 - 1-204, 1976. 5 fig, 5 ref.

Descriptors: *Model studies, *Sampling, *Sediment yield, *Hydrographs, Rainfall, Precipitation(Atmospheric), Runoff, Erosion, Soil erosion, Watersheds(Basins), Sediments, Sedimentation, Infiltration, Sheet erosion, Channel erosion, Mathematical models, Hydraulics, Routing, Storms, Streamflow.

In many past studies, a statistical interpretation of observed data has been utilized to solve sediment-yield and related problems. It is difficult to predict the response of a watershed to various land developments or treatments using these methods because they are based on the assumption of homogeneity in time and space. Numerical modelling using equations describing the physical processes is a viable way to study the effects of various watershed treatments or land developments on water and sediment yields from watersheds. The numerical model presented in this paper simulated the physical processes by which water and sediment are moved overland to and down creeks and rivers in watersheds. Some of the processes modeled were interception and infiltration from rainfall, overland flow from excess rainfall, sediment production due to raindrop impact, sheet erosion by overland flow, channel erosion, and the water and sediment routing through the channel system. A nonlinear kinematic-wave approximation for flow routing was used to route water and sediment overland and in channels. For the watershed simulated, the computed water and sediment yields agreed with the measured water and sediment yields. In addition, this model had the capability to predict watershed treatment effects on individual water and sediment hydrographs and long-term yields, and to identify the sediment sources in watersheds. (See also W77-00775) (Sims-ISWS)
W77-00790

SOURCES AND SEDIMENT YIELD OF HAWAIIAN WATERSHED AND COASTAL SEDIMENTS,
Hawaii Univ., Honolulu. Dept. of Geology and Geophysics; and Hawaii Inst. of Geophysics.
For primary bibliographic entry see Field 2J.
W77-00791

THE HYDROLOGIC AND SEDIMENT PROCESSES IN NATURAL WATERSHED AREAS,
Hydrocomp International, Palo Alto, Calif.; and Hydrocomp International, Glasgow (Scotland).
G. Fleming, and K. M. Leytham.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 1-232 - 1-246, 1976. 1 fig, 13 ref.

Descriptors: *Sedimentation, *Sediments, *Model studies, Data collections, Data processing, Hydrology, Soil erosion, Rainfall, Runoff, Sheet erosion, Land use.
Identifiers: *Sediment processes.

In a world rather belatedly concerned with rational use of its resources, the understanding, prediction and control of sediment processes is becoming a topic of some considerable importance. Sediment may effectively limit the useful life of storage facilities in some parts of the globe and in others sheet erosion and resulting soil degradation may be fatal to both human life and a nation's viable exstence. Advanced countries and various international agencies must work to develop approaches of universal applicability for land use management in the widest meaning of the word. The widespread practical application of conceptual sediment models would appear to be limited by serious shortages of basic data. This is true even for simple models such as Negev's, although it is hoped that sufficient data may be obtainable for its use to be viable within the U.S.A. One problem is that in this multi-disciplinary subject, data sources are widely scattered, often in obscure places. The establishment of some control archive for data concerned with land-use activities and management could be of considerable value. Another problem which has been recognized in the past is the chaotic state of sediment transport study with its enormous variety of definitions and terms, units, methods of measurement and a very confus-

ing array of formula and equations which often do not explicitly state assumptions of limits of applicability. (See also W77-00775) (Sims-ISWS)
W77-00792

COMPARATIVE COSTS OF EROSION AND SEDIMENTATION CONTROL MEASURES,
Irrigation/Agriculture Engineering-Science, Inc., Berkeley, Calif.
K. H. Ateshian.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C. Sedimentation Committee, p 2-13 - 2-23, 1976. 1 fig, 2 tab, 5 ref.

Descriptors: *Erosion control, *Sediment control, *Cost comparisons, *Construction costs, Economics, Soil erosion, Sediments, Sedimentation, Rainfall, Runoff, Control structures, Construction, Hydraulic structures, Sedimentary structures, Equipment, Materials, Labor.

Cost information on erosion and sediment control measures for 25 methods in current widespread use were presented in a manner to provide a sound basis for estimating local costs. Using three principal cost elements: materials, labor, and equipment, the detailed unit costs presented can also be up-dated to reflect inflationary trends in conjunction with an accepted cost index such as the ENR Construction Cost Index. The simplified procedures developed for estimating rainfall erosion index permit the prediction of soil loss (using the Universal Soil-Loss Equation) for selected watersheds. The cost data, when applied to soil losses, will reflect comparative costs per ton of soil retained. Control effectiveness and economic life of each method can then be used to determine comparable annual cost figures. With this final step, the process of engineering decision-making and selection can be greatly simplified. (See also W77-00775) (Sims-ISWS)
W77-00794

SOIL RIPPING TREATMENTS FOR RUNOFF AND EROSION CONTROL,
Forest Service (USDA), Albuquerque, N. M. Rocky Mountain Forest and Range Experiment Station.
E. F. Aldon.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 2-24 - 2-29, 1976. 8 ref.

Descriptors: *Erosion control, *Runoff, *Arid lands, *New Mexico, Vegetation, Vegetation effects, Watersheds(Basins), Soils, Ranges, Drainage, Plant growth, Pastures, Forage grasses, Range grasses, Rainfall.
Identifiers: *Soil ripping, *Rio Puerco(NM).

Soil ripping, a form of deep, wide plowing, effectively reduces runoff and erosion from semi-arid watersheds. This treatment has been used by land managers on highly erosive soils in the Rio Puerco drainage of New Mexico to hold moisture where it falls, therby increasing plant growth and decreasing erosion. This paper reported on a study done on and near the San Luis Watersheds on the Rio Puerco drainage, 93 km (58 miles) northwest of Albuquerque, New Mexico, in the transition zone between woodland and semi-desert grassland. The area is comprised of mesas or uplands, steep rocky breaks, and alluvial grasslands. Surface runoff was still reduced 85% and erosion 31% 3 years after the soil ripping treatment. Treatment effectiveness declined after 3 to 5 years depending on amounts and intensities of summer thunderstorms. Opening old rips that were sealed over with sediment was as effective in controlling runoff as ripping between old rips. Reripping by either method reduced runoff by two-thirds compared with untreated check plots. Ripping caused a favorable shift in forage production from galleta to alkali sacaton. It was learned that ripping effects on runoff are short-lived, but forage production patterns may persist for 10 years; ripping must be done carefully to avoid subterranean channel formation (erosion by soil piping). (See also W77-00775) (Sims-ISWS)
W77-00795

SOIL AND WATER LOSS FROM IMPOUNDMENT TERRACE SYSTEMS,
Agricultural Research Service, Ames, Iowa.
J. M. Laflen, and H. P. Johnson.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 2-30 - 2-41, 1976. 4 fig, 11 ref.

Descriptors: *Terracing, *Erosion control, *Impoundments, *Graphical analysis, Impounded wates, Soil erosion, Sediment control, Agricultural runoff, Agricultural watersheds, Ponding, Tile drains, Conduits, Drains, Erosion, Infiltration.
Identifiers: *Impoundment terraces.

Impoundment terrace systems greatly reduce sediment discharge from agricultural watersheds. Graphs were presented for selecting orifice size and predicting sediment discharge. Construction and operation problems with impoundment terraces were described, as well as methods for solving these problems. (See also W77-00775) (Sims-ISWS)
W77-00796

EXCAVATED SEDIMENT TRAPS PROVE SUPERIOR TO DAMMED ONES,
Forest Service (USDA), Rolla, Mo. National Forests in Missouri.
C. P. Tryon, B. L. Parsons, and M. R. Miller.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 2-42 - 2-51, 1976. 4 fig, 4 ref.

Descriptors: *Sediment control, *Excavation, *Settling basins, *Missouri, Runoff, Dams, Sedimentation, Construction, Construction costs, Drainage, Industries, Earthworks, Drainage engineering, Controlled drainage, Surface runoff, Sedimentology.
Identifiers: *Sediment traps, Detention dams, Excavated sediment traps.

Stilling basins and various other kinds of small impoundments have been used to trap eroded sediment for many years. Numerous publications, people, and agencies seek to increase their use by extolling their merits. Virtually nowhere, however, is the idea of excavated--rather than impounded--sediment traps even mentioned, let alone recommended as a superior method of accomplishing the sediment control task. A decade of experience on large earth moving jobs in the rugged Missouri Ozarks has shown that excavated sediment traps are incomparably superior to small detention dams in terms of cost, industry acceptance, and sediment trap efficiency. This 'how to' article was a working man's guide to excavated sediment trap design and construction. (See also W77-00775) (Sims-ISWS)
W77-00797

EROSION AND SEDIMENT CONTROL ON RESHAPED LAND,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
L. D. Meyer, and M. J. M. Romkens.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 2-65 - 2-76, 1976. 7 fig, 1 tab, 26 ref.

Descriptors: *Erosion control, *Sediment control, *Land forming, Rainfall, Runoff, Topography, Soils, Slopes, Mulching, Erosion, Soil erosion, Sedimentation, Settling basins, Vegetation, Road construction, Urbanization, Construction.
Identifiers: Soil erodibility, Erosive potential, Sediment traps.

Recent research concerning soil erosion and sediment control on land reshaped for nonagricultural purposes was discussed. Included in this discussion were: adaptation of the Universal Soil Loss Equation, variability of rainfall erosiveness, evaluations of soil erodibility and topographic effects, influence of mulch rates and types, and enhancement of rapid revegetation. Implications of this knowledge and areas of research needs were indicated. (See also W77-00775) (Sims-ISWS)
W77-00798

DEFINING THE SEDIMENT TRAPPING CHARACTERISTICS OF A VEGETATIVE BUFFER. SPECIAL CASE: ROAD EROSION,
Forest Service, Denver, Colo. Rocky Mountain Region.
C. A. Ohlander.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 2-77 - 2-82, 1976. 1 tab, 10 ref.

Descriptors: *Sediment control, *Drainage, *Roads, *Vegetation, Erosion, Sediments, Vegetation effects, Sedimentation, Highways, Runoff, Soils, Soil erosion, Water quality, Equations.
Identifiers: *Road drainage, Standard buffer, Sediment traps, Runoff curve number.

This paper discussed the amount of sediment trapped by a vegetative buffer that may exist below a road drainage outlet. The buffer characteristics were defined in relationship to slope percent, soil erodibility, and a soil-cover complex index called the Runoff Curve Number (RCN). A Standard Buffer was defined as a particular length of site capable of trapping 953 kilograms of sediment per year: Standard Buffer, meters = (16.16 + 17.69 Soil K + 1.34 Slope percent) x (31RCN)/(6900 - 69 RCN), where: Standard Buffer is the slope distance needed for filtering out the sediment, soil 'K' is the soil erodibility index from the universal soil loss equation, and RCN is the Runoff Curve Number from the Soil Conservation Service Engineering Handbook. It was found that the ratio of actual buffer distance to the Standard Buffer distance times 953 kilograms equals the yearly sediment trapped. It was concluded that the relationship of Road Erosion minus Sediment Trapped has implications that can be used as a first approximation of some land use effects on water quality. (See also W77-00775) (Sims-ISWS)
W77-00799

GEOTECHNICAL MANAGEMENT OF FOREST LANDS IN GRANITIC TERRANE,
Forest Service (USDA), Medford, Oreg. Rogue River National Forest.
For primary bibliographic entry see Field 4C.
W77-00800

EVALUATION OF AN EXTENSIVE SEDIMENT CONTROL EFFORT IN THE LOS ANGELES RIVER BASIN,
Forest Service (USDA), Turlock, Calif. Stanislaus National Forest.
E. C. Ruby.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 2-91 - 2-102, 1976. 7 fig, 3 ref.

Descriptors: *Sediment control, *Dams, *Sediment yield, *California, Floods, Forests,

Forest fires, Regression analysis, Sedimentation, watersheds(Basins), Sediments, Sedimentary structures, Sediment transport, Runoff, Rivers, Erosion.
Identifiers: *Check dams, *Los Angeles River Basin(Calif).

The Los Angeles River Flood Prevention Project, authorized by Congress in 1941, included sediment control. One component of the plan was to construct 852 small check dams, 24 to 30 feet in height, in key channels, using reinforced concrete cribbing. The study used single regression analysis to relate the sediment yield of treated channels, for several years before treatment, to a norm. The treated channel was then related to the same norm to determine its post treatment performance to the amount of sediment expected without treatment. A second regression used annual runoff, in place of the norm, to analyze the influence of check dams. The conclusions of the study were: (1) There is a temporary reduction in the sediment yield to the basin during the time that the check dam system fills to mature debris cones. (2) Once the system is full, the sediment yield at the basin will return to normal, or perphaps slightly higher than normal. (3) The check dam systems do not influence the rate of sedimentation relative to runoff. (4) A burned watershed, or a major flood, can induce a treated channel to unload the temporary sediment storage in the system. This can be a small volume, or a catastrophic amount, depending on how many years have elapsed in which to store sediments. (5) The check dam systems can be breached by large boulders in major floods. (See also W77-00775) (Sims-ISWS)
W77-00801

SEDIMENT CONTROL AT IMPERIAL DAM,
Bureau of Reclamation, Yuma, Ariz. Yuma Projects Office.
T. H. Moser, and W. D. Sears.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 2-103 - 2-123, 1976. 4 fig, 1 tab, 10 ref.

Descriptors: *Sediment control, *Dams, *Colorado River, Sediments, Settling basins, Dredging, Suspended solids, Sediment load, Sediment transport, Sediment yield, Canals, Silts, *Arizona.
Identifiers: *Imperial Dam(Ariz), *Parker Dam(Ariz).

The construction of major dams and reservoirs on the Colorado River has reduced the chance of major floods and generally stabilized the river. However, along much of the lower Colorado River, channel and bank stabilization work is still required to reduce the sediment transport to a practical minimum within multi-purpose concepts for control and usage of the river facility. In the 238 kilometer (148 mile) meandering river channel from Parker Dam to Imperial Dam, sediment is continuing to be transported downstream in large quantities. The amount transported is largely contingent on the flow in the river and the degree of stabilization. Some reaches of the river have received stabilization treatment while other reaches have not. Since about 1963 water has been released from storage at Parker Dam only in the amount required for downstream irrigation and domestic uses and for scheduled deliveries of Treaty water to Mexico. As a result of these conditions, an annual average of about 726,000 metric tons (800,000 U.S. tons) of sediment have passed Imperial Dam in recent years. In addition, however, there has been a continued buildup of sediment in the reservoir. In the design of Imperial Dam, quite different sediment control facilities were provided for the two canal diversions. The All-American Canal desilting facilities consist of three double basins with 12 large rotating scrapers in each half basin. On the Gila Gravity Main Canal a flushing-type settling basin was used. Sediment from the control facilities is returned to the river below Imperial Dam where it is sluiced downstream to Laguna Settling Basin. At this location sediment is periodically removed by dredge. Dredging is also required periodically to keep a channel open to the Gila Canal headworks. (See also W77-00775) (Sims-ISWS)
W77-00802

DETERMINING EROSION FROM HAWAIIAN AGRICULTURAL LANDS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
G. W. Frasier, J. A. Replogle, K. R. Cooley, and S. A. El-Swaify.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 2-124 - 2-134, 1976. 2 fig, 2 tab, 13 ref.

Descriptors: *Soil erosion, *Sediments, *Hawaii, *Agricultural runoff, Watersheds(Basins), Agricultural watersheds, Agriculture, Farm management, Measurement, Instrumentation, Sampling, Suspended solids, Crops, Flumes, Sugarcane, Rainfall, Runoff, Sedimentation, Sediment control.
Identifiers: Pineapples.

Techniques, instrumentation, and preliminary results of studies to determine the natural rainfall runoff and associated soil erosion from six small watersheds within fields of sugarcane and pineapple in Hawaii were presented. The initial results indicated that with current cultural practices, rainfall runoff and soil erosion are negligible from fields with a crop cover, but may be significant from roads within the cropped area, and during and after harvest. (See also W77-00775) (Sims-ISWS)
W77-00803

THE UNIVERSAL SOIL LOSS EQUATION AS ADAPTED TO THE PACIFIC NORTHWEST,
Washington State Univ., Pullman. Agricultural Research Center.
For primary bibliographic entry see Field 2J.
W77-00804

TECHNIQUES OF RESEARCHING INFORMATION FOR THE DEVELOPMENT OF A MANUAL TO VEGETATE SOILS OF LOW PRODUCTIVITY DISTURBED BY CONSTRUCTION ACTIVITIES,
Midwest Research Inst. Kansas City, Mo.
F. W. Bennett, and R. L. Donahue.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 2-148 - 2-157, 1976. 2 fig, 1 tab, 3 ref.

Descriptors: *Publications, *Soils, *Erosion, *Vegetation, Information exchange, Information retrieval, Libraries, Reviews, Technical writing, Soil types, Construction, Soil-water-plant relationships, Soil classification, Erosion control, Sediment control, Projects.
Identifiers: *Manual development.

This paper explained the strategy, planning procedure, resource personnel used, documentation, and special problems encountered by the Midwest Research Institute in the process of developing a manual under contract with the United States Environmental Protection Agency on vegetating soils of low productivity disturbed by construction activities. The manual emphasized the control of soil erosion and the reduction in emission of sediment. Persons, agencies, and institutions contacted for resouce information totalled 203. More than 1,000 documents were studied, 420 of which were considered sufficiently useful to be included in the list of references. (See also W77-00775) (Sims-ISWS)
W77-00805

THE DILEMMAS OF SETTING SEDIMENT STANDARDS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W77-00806

DESIGN AND PERFORMANCE OF ROCK REVETMENT TOES,
Army Engineer District, Kansas City, Mo. Hydrologic Engineering Branch.
For primary bibliographic entry see Field 8D.
W77-00807

CONTROL OF TURBIDITY AT CONSTRUCTION SITES,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
E. J. Carlson.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 2-180 - 2-190, 1976. 1 tab, 19 ref.

Descriptors: *Erosion control, *Turbidity, *Suspended solids, *Regulation, Soil erosion, Construction, Legal aspects, Water pollution, Legislation, Sediment control, Measurement, Monitoring, Information exchange, Construction costs, Reservoirs, Dams.
Identifiers: *Turbidity control, *Public Law 92-500, Construction sites.

A study team was organized at the Bureau of Reclamation Engineering and Research Center, Denver, Colorado, to collect and disseminate information on Control of Turbidity at Construction Sites following the requirements of Public Law 92-500. A summary of most of the areas in which information was assembled was included in the report. A statement of policy on water pollution control in the United States by the Board of Control of the Water Pollution Control Federation was given. Public Law 92-500 and two Executive Orders from the Office of the President on pollution control were reviewed. The National Pollution Discharge Elimination System (NPDES) was described. Turbidity measurement and causes of turbidity at construction sites were described. An example of analysis of turbidity data obtained with typical turbidity measuring instruments and the accuracy obtained was given. Some typical variations of bid prices for control of turbidity at typical Bureau of Reclamation projects were listed. The variation of turbidity standards in the Western United States was discussed. (See also W77-00775) (Sims-ISWS)
W77-00808

NUTRIENTS LOST IN DEBRIS AND RUNOFF WATER FROM A BURNED CHAPARRAL WATERSHED,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W77-00810

SEDIMENT PROBLEMS IN THE MOHAVE VALLEY - A CASE HISTORY,
Bureau of Reclamation, Boulder City, Nev. Region 3; and Bureau of Reclamation, Boulder City, Nev. River Development Branch.
E. L. Johns.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 4-64 - 4-75, 1976. 2 fig, 1 tab, 4 ref.

Descriptors: *Sedimentation, *Colorado River, *Reservoirs, *Environment, Rivers, Management,

Water management(Applied), Sediment load, Bed load, Aggradation, Fish, Wildlife, Wildlife management, Valleys, Marshes, Lakes, Settling basins, Recreation, Sedimentology, Arizona, California, Nevada.
Identifiers: *Lower Colorado River, *Mohave Valley(Ariz-Calif-Nev).

Sedimentation technology plays an important role in the Bureau of Reclamation's Lower Colorado River Management Program. Public demands also receive major consideration in the decision-making process. The experience of the Bureau of Reclamation in the Mohave Valley after construction of Parker Dam was discussed. Aggradation above Lake Havasu caused a critical situation near Needles, California, where railroad facilities and other developments were inundated or threatened by the rising river. This prompted passage of Federal legislation and authorized the Bureau of Reclamation to take the needed action. In its early stages, the river management program centered on reconstruction of the river channel by dredging and related work. It evolved by stages into a comprehensive program which now includes the improvement of the river and related features for fish and wildlife, general recreation, and other uses. The gathering of sediment and hydraulic data is an essential part of the overall program. Selected information from the data collection program was summarized to illustrate some of the changes brought about. The changing requirements in the Mohave Valley were discussed. Future management will be governed increasingly by publicly expressed environmental concerns. Methods of assuring appropriate input in program planning such as formation of the Lower Colorado River Management Program Coordinating Committee were described. (See also W77-00775) (Sims-ISWS)
W77-00820

SEDIMENT TRANSPORT STUDIES IN THE DELTA-MENDOTA CANAL AND THE CALIFORNIA AQUEDUCT,
Bureau of Reclamation, Sacramento, Calif. Mid-Pacific Regional Office.
For primary bibliographic entry see Field 2L.
W77-00822

THE ROLE OF SEDIMENT PROBLEMS IN HYDROELECTRIC DEVELOPMENT,
Federal Power Commission, Washington, D.C. Office of Energy Systems.
S. S. Fan.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 4-149 - 4-161, 1976. 10 ref.

Descriptors: *Sedimentation, *Reservoirs, *Rivers, *Dams, Sediments, Effects, Erosion, Suspended solids, Hydroelectric plants, Lake sediments, Water resources, Storage capacity, Silts, Sediment control, Sediment yield, Fish, Sedimentology.

When an artificial interference, such as a dam, is built on a graded river, the streamflow characteristics and the sediment carrying capacity of the river change. These modifications upset the equilibrium already established in that river. In turn, this unbalanced situation sometimes has a significant and unexpected impact on the environments in the vicinity of and, possibly, far away from the dam structure. This paper briefly defined the sedimentation problems involved and discussed the factors of concern in the design and planning of a hydroelectric project. Considerations from the engineering, environmental, and economic point of view were included. Also, deficiencies in the present technology and necessary research were discussed. (See also W77-00775) (Sims-ISWS)
W77-00826

SEDIMENTATION IN COON CREEK VALLEY, WISCONSIN,
California Univ., Los Angeles. Dept. of Geography.
S. W. Trimble.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 5-100 - 5-112, 1976. 7 fig, 4 tab, 4 ref.

Descriptors: *Sedimentation, *Deposition(Sediments), *Erosion, *Wisconsin, Watersheds(Basins), Valleys, Agriculture, Land use, Channel morphology, Bank erosion, Soil erosion, Surveys, Erosion control, Sediment control, Sedimentology.
Identifiers: *Coon Creek(Wis), Driftless area.

Coon Creek Valley is a severely eroded watershed in the driftless area of Wisconsin. Between c. 1850 and 1938, a net total of about 19,500 cu dkm (16,000 acre-ft) of sediment was deposited within the system, a rate of about 56 cu dkm/sq km (116 acre-ft/sq mi), or 0.7 cu dkm/sq km/yr (1.5 acre-ft/sq mi/yr) from the watershed exclusive of the main valley flood plains. These figures do not include colluvium or material transported from the system by streamflow. Recent studies concluded that between 1938 and 1974 sedimentation continued, but the total represents only about half the previous rate. Within the system, however, there continued a partial transfer of material with net export from tributaries and net deposition in the lower-gradient main valley. Within the past few years, there has been little deposition, and the present rate may be less than 10% of the high rates of the 1920's and 30's. This decrease was attributed primarily to changes of land use and land treatment. (See also W77-00775) (Sims-ISWS)
W77-00835

CHANNEL IMPROVEMENTS OF THE MISSOURI RIVER,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
E. V. Richardson, and H. Christian.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 5-113 - 5-124, 1976. 9 fig, 1 tab, 12 ref.

Descriptors: *Missouri River, *Channel improvement, *Sediment control, *Erosion control, Dams, Dikes, Structures, Braiding, Sediment discharge, Flow, Streamflow, Suspended solids, Deposition(Sediments), River beds, Particle size, Navigation, Flood control, Discharge(Water), Engineering, Rivers.
Identifiers: Channelization.

The lower Missouri River channelization is a classic example of engineers who worked with nature to change a liability to an asset. The Missouri was changed from an uncontrolled, sediment laden, unsightly, flooding, and eroding river to an orderly, well-behaved, clear and scenic river. The river was changed from an economic drain to an asset. The Missouri River is about 2500 miles long. At Sioux City, Iowa it has an average annual flow of 31,700 cfs (73 years of record). Prior to river development, the average annual sediment discharge was 164 million tons at Omaha, Nebraska (13 years of record). After development, average annual discharge decreased to 28 million tons (19 years of record). (See also W77-00775) (Sims-ISWS)
W77-00836

PATTERNS OF SCOUR AND FILL IN POOL-RAPID RIVERS,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 2J.
W77-00837

SEDIMENT RUNOFF DURING HIGHWAY CONSTRUCTION,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4C.
W77-00847

WATER RESOURCES OF THE ROCK RIVER WATERSHED, SOUTHWESTERN MINNESOTA,
Geological Survey, St. Paul, Minn.
For primary bibliographic entry see Field 7C.
W77-00848

WATER RESOURCES OF THE ROOT RIVER WATERSHED, SOUTHEASTERN MINNESOTA,
Geological Survey, St. Paul, Minn.
For primary bibliographic entry see Field 7C.
W77-00849

COMPARISON OF SYSTEMS AND PHYSICAL HYDROLOGY APPROACHES TO HYDROLOGIC MODELLING,
Wollongong Univ. Coll. (Australia).
For primary bibliographic entry see Field 2A.
W77-00939

THE APPLICATION OF THE SACRAMENTO RAINFALL MODEL TO A LARGE ARID CATCHMENT IN WESTERN AUSTRALIA,
Snowy Mountains Engineering Corp., Cooma (Australia).
For primary bibliographic entry see Field 2A.
W77-00951

WIND EROSION OF SAND AND MEASURES FOR RECLAMATION IN THE ZONE OF THE KARA KUM CANAL, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
O. R. Kurbanov, and A. Arnalgel Dyev.
Probl Osvoeniya Pustyn 2, p 76-79, 1975.

Descriptors: *Wind erosion, *Sands, Canals, *Land reclamation, Erosion control.
Identifiers: *Turkmen-SSR, *Kara Kum Canal(USSR).

The Kara Kum Canal (Turkmen SSR, USSR) possesses a peculiar wind regime causing sand deflation in some areas. Annual sand movement has been directed southeastward, almost in a perpendicular manner to the Kara-Kum canal course. Therefore most reclamation work should be done on the right bank of the canal.—Copyright 1976, Biological Abstracts, Inc.
W77-00970

SOILS OF THE MESHED TRACT IN SOUTHWESTERN TURKMEN SSR, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
For primary bibliographic entry see Field 2G.
W77-00975

WATERSHED IMPROVEMENT DISTRICTS.
For primary bibliographic entry see Field 6E.
W77-01000

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

DEVELOPMENT OF A SYSTEM TO DETECT AND MONITOR SEDIMENT POLLUTION,
Rhode Island Univ., Kingston. Dept. of Civil and Ocean Engineering.
For primary bibliographic entry see Field 5B.
W77-00539

SIMPLE METHOD MEASURES SUSPENDED SOLIDS,
American Enka Co., Clemson, S.C.
D. F. Rich, J. R. VanSurdam, and P. Karr.
Water and Sewage Works, Vol. 123, No. 7, p 46-47, July, 1976. 3 ref.

Descriptors: *Analytical techniques, *Suspended solids, *Measurement, *Sampling, Equipment, Costs, Performance, Water quality control, Waste water treatment, *Pollution identification.

A simple method for estimating the amount of suspended solids in a clarifier is described which gives more accurate results than those obtained by the conventional method of multiplying the mixed liquor suspended solids concentration by the clarifier volume. The method involves lowering an open-ended plexiglass tube in the clarifier. When this tube reaches the clarifier bottom, a hinged stopper mounted on the bottom of the tube is pushed into the end of the plexiglass tube, thereby sealing it. The tube is then withdrawn from the clarifier and its contents dumped into a container and thoroughly mixed. Suspended solids determined on a sample taken from this container represent the average solids concentration in a vertical plane through the clarifier. Multiplying this concentration by the volume of the clarifier provides a better estimate of the amount of solids in the clarifier. A commercial sampler for employing the above technique has been built at a total cost of $38.00 which covers the tube assembly parts, mast, and hoist. (Kreager-FIRL)
W77-00596

APPLICATIONS OF AUTOMATIC EQUIPMENT TO WATER ANALYSIS,
D. G. Thomson.
Process Biochemistry, Vol. 11, No. 5, p 44-45, June 1976. 3 tab.

Descriptors: *Pollutant identification, *Analytical techniques, *Automation, *Monitoring, Phenols, Ammonium compounds, Phosphates, Nitrates, Nitrites, Chemical oxygen demand, Nitrogen, Ammonia, Chlorides, Silica, Equipment, *Water analysis.
Identifiers: Cyanide, Thiocyanate.

Advances in the automation of water analysis equipment are reviewed. An automatic analyzer capable of measuring thiocyanate, phenols, cyanide, ammonium ion, phosphate, and nitrate/nitrite is described along with its application to coke oven effluent monitoring. An automatic instrument for measuring chemical oxygen demand involves the use of an aluminum heating block which can be programmed by the operator. A self-contained series of reflux heads fits directly onto the system, thus allowing the simultaneous digestion of up to 20 samples over an exactly timed and temperature controlled interval. The digested sample is then transferred to sample cups where chemical oxygen demand is determined automatically. An automatic analyzer capable of measuring nitrite, total organic nitrogen, phosphate, ammonia, chloride, and silica is also described. The instrument is capable of handling 60 samples/hour and has the capacity for up to 12 channels. (Kreager-FIRL)
W77-00597

MULTIELEMENT AND CHLORINATED HYDROCARBON ANALYSIS OF MUNICIPAL SEWAGE SLUDGES OF AMERICAN CITIES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Nuclear Reactor Lab.
A. K. Furr, A. W. Lawrence, S. S. C. Tong, M. C. Grandolfo, and R. A. Hofstader.
Environmental Science and Technology, Vol. 10, No. 7, p 683-687, July 1976. 2 tab, 32 ref.

Descriptors: *Sewage sludge, *Pollutant identification, *Dieldrin, *Polychlorinated biphenyls, *Trace elements, Cities, Surveys, Fluorine, Gold, Mercury, Copper, Lead, Nickel, Zinc, Municipal wastes.
Identifiers: Barium, Antimony, *Chlorinated hydrocarbons.

Data from an analytical survey of 68 elements, dieldrin, and polychlorinated biphenyls conducted on municipal sewage sludges sampled during 1972-1973 from 16 American cities are reported. Fluorine levels were high for several cities which fluoridate their water. The level of polychlorinated biphenyls was highest for Schenectady, New York and was possibly the result of wastes generated by a predominant manufacture of electrical equipment in the city. Levels of gold were especially high in Miami and San Francisco sludges. Mercury was also high in these same two sludges. The high levels of both metals may be due to geochemical sources. A number of elements were notably high in sludges from other specific cities. These included: antimony, copper, and lead (Philadelphia); nickel (Denver, Los Angeles, Miami, Milwaukee, and Philadelphia); barium (Ithaca and Los Angeles); and zinc (Los Angeles and Philadelphia). (Kreager-FIRL)
W77-00598

CADMIUM ACCRUAL IN COMBINED WASTE-WATER TREATMENT-AQUACULTURE SYSTEM,
Environmental Management Inst. Marion, Mass.
For primary bibliographic entry see Field 5D.
W77-00600

INSTRUMENTATION IN THE WATER INDUSTRY.
Water Services, Vol. 80, No. 964, p 370, 372, June, 1976.

Descriptors: *Flow measurement, *Monitoring, *Effluents, *Weirs, Hydraulic structures, Flow, Engineering structures, Analytical techniques, Liquid wastes, Flow rates, *Instrumentation.

A technique for measuring and recording effluent flow is described. The technique employs a vee-notch weir tank in the effluent channel in which the head of liquid over the weir has a known relationship to the rate of flow. A dip-tube fed with compressed air in the tank converts the head of liquid into a pressure which is fed to a suitably calibrated liquid flow recorder. If it is not practicable to fit a weir tank, the recorder can be used in conjunction with a venturi flume. The use of a vee-notch weir plate is preferred because it has the advantage that the shape of the issuing jet is geometrically similar at all heads. This makes it possible to use a standard scale shape for the recorder and gives interchangeability of chart ranges. As in all weir plate measurements, the liquid should be practically motionless apart from the movement of particles towards the notch. In practice this is achieved by fitting the weir plate in the side or end of a tank at a point remote from the notch. (Kreiger-FIRL)
W77-00601

VARIABLE NATURE OF CHEMICAL COMPOSITION OF SEWAGE SLUDGES,
Purdue Univ., Lafayette, Ind. Inst. of Environmental Health; and Purdue Univ., Lafayette, Ind. Agricultural Experimental Station.
L. E. Sommers, D. W. Nelson, and K. J. Yost.
Journal of Environmental Quality, Vol. 5, No. 3, p 303-306, July-September, 1976. 6 tab, 11 ref.

Descriptors: *Pollution identification, *Sewage sludge, *Chemical analysis, *Municipal wastes, *Chemical properties, Indiana, Cities, Carbon, Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Iron, Cadmium, Zinc, Copper, Nickel, Lead, Sludge disposal, Organic compounds, Inorganic compounds.

Sewage sludge samples were collected over a 2-year period from eight Indiana cities and were analyzed for carbon, nitrogen, phosphorus, potassium, calcium, magnesium, ironn, cadmium, zinc, copper, nickel, and lead. The sludges contained approximately 50% organic matter and 1-4% inorganic carbon. Organic and inorganic carbon, organic nitrogen, inorganic phosphorus, calcium, and magnesium were present in a given sludge at a relatively constant concentration with respect to sampling time. Inorganic nitrogen, organic phosphorus, potassium, and all metals were found to be quite variable with time for sewage sludge produced by a given city. In general, organic nitrogen and inorganic phosphorus constituted the majority of total nitrogen and phosphorus, respectively, in sludges. The largest deviations between the mean and median were found for cadmium, zinc, copper, nickel, and lead. The variable nature of inorganic nitrogen and metals in sludges indicates that a sound sampling and analysis program is essential prior to formulating recommendations for rates of sewage sludge application to soils used for crop production. (Kreager-FIRL)
W77-00602

COMPLEXATION OF TRACE METALS BY ETHYLENEDIAMINETETRAACETIC ACID (EDTA) IN NATURAL WATERS,
Water Pollution Research Lab., Stevenage (England).
J. Gardiner.
Water Research, Vol 10, No 6, p 507-514, 1976. 3 fig, 4 tab, 33 ref.

Descriptors: *Chelation, *Organic acids, *Metals, *Sewage, Surface waters, Chemical analysis, Mathematical studies, Domestic wastes, Water pollution effects, Fish, Algae, Calcium, Ions, Toxicity, Detergents.
Identifiers: Complexation, Metal organic complexes, Ethylenediaminetetraacetic acid.

Concentrations of the chelating agent ethylenediaminetetraacetic acid in detergents, primary and secondary sewage, and river water were determined, and a method for calculating the extent of complexation of trace metals by the chelating agent in the presence of calcium and other complexing agents was developed. Ethylenediaminetetraacetic acid was present at an average concentration of 170 micrograms/liter in domestic sewage and at higher concentrations in sewage containing industrial effluents. Calculations revealed that despite the competitive effect of calcium in hard water, ethylenediaminetetraacetic acid at the concentrations found in sewage and river water is sufficient in most cases to complex most of the important trace metals to a considerable extent. The tendency of ethylenediaminetetraacetic acid to keep metal ions in solution could lead to increased trace metal mobility in water courses and a reduced rate of removal of trace metals by adsorption and precipitation in lakes and reservoirs. Chelating agents may also be a factor in stimulating algal growth and in reducing the toxicity of trace metals to fish. Insufficient information exists to establish the net effect of ethylenediaminetetraacetic acid on the aquatic environment, however. (Kreager-FIRL)
W77-00604

PRECISION AQUARATOR SPEEDS COD DETERMINATION,
T. Viraraghavan.
Water and Sewage Works, Vol. 123, No. 8, p 80-81, August, 1976. 3 fig, 1 tab, 3 ref.

Descriptors: *Chemical oxygen demand, *Analytical techniques, *Pollutant identification, *Spectroscopy, *Oxidation, Instrumentation, Carbon dioxide, Chemical reactions.
Identifiers: Nondispersive infrared analysis.

A device which produces rapid and reliable chemical oxygen demand detrminations is described that works on the combustion-infrared principle. A 20-microliter sample (homogenized in a Waring blender) is injected by syringe into the instrument. The sample is swept through a platinum catalytic combustion furnace by a stream of dry carbon dioxide which oxidizes the pollutants to carbon monoxide and water. The water is stripped out in a drying tube, and the reaction products are then passed through a second platinum catalytic treatment. The carbon monoxide concentration is then measured by an integral nondispersive infrared analyzer, and the resultant reading is directly converted to chemical oxygen demand by the use of a calibration curve. The method is best suited for oxygen demands in the range of 50-300 milligrams/liter, although operation down to 10 milligrams/liter is feasible. (Kreager-FIRL)
W77-00605

DEVELOPMENT OF WATER QUALITY SAMPLING PROGRAMS,
Hydrocomp, Inc., Palo Alto, Calif.
R. G. Bourne.
Simulation Network Newsletter, Vol. 8, No. 2, p 1-8, March 1976. 2 fig, 1 tab.

Descriptors: *Analytical techniques, *Water quality, *Water sampling, Programs, *Data collections, Model studies, Analysis, Planning, Sampling.

Procedures are described which should be followed in developing a sampling program that provides data not only characteristic of water quality within the system but also that meet requirements necessary for use by the selected model. A study for the Central Midlands Regional Planning council (CMRPC) is used to illustrate the development of such a sampling program. The scope of the sampling program is defined by the overall goals and objectives of a water quality study. Awareness of model requirements is also essential to the development of a sampling program which provides homogeneous data series acceptable to the model. Data which are not representative of temporal and spatial variations in the system have little value. The first step in designing a water quality sampling program is determining the goals and objectives of the water quality study. The sampling program should then be designed as a function of the goals and objectives. The model which is best suited to providing the necessary analyses required to meet the goals and objectives of the study should then be selected. The sampling program should then be re-examined and altered if necessary to assure that the input requirements of the model will be satisfied by the data. (Snyder-FIRL)
W77-00618

HYDROGEN SULFIDE IN BOTTOM WATER NEAR A SEWAGE SLUDGE DUMPING SITE,
Brookhaven National Lab., Upton, N.Y. Dept. of Applied Science.
F. W. Barvenik, F. B. Hill, V. P. Aneja, and R. M. Felder.
Technical Report BNL 20778, October, 1975. 27 p, 6 fig, 3 tab, 30 ref.

Descriptors: *Pollutant identification, *Analytical techniques, *Hydrogen sulfide, Aquatic environment, *Seawater, Sewage sludge, Sludge disposal, Gas chromatography, On-site investigations, New York.
Identifiers: Reduced sulfur compounds, Disposal sites, *New York Bight.

An attempt was made to determine the concentrations of reduced sulfur compounds in bottom water in the vicinity of a sewage sludge dumping site in the apex of the New York Bight and to determine the utility of a field-adapted gas chromatographic system as an analytical tool for such a study. The study site was in the center of a depression which tends to collect sludge sediments; the water depth at the site is about 33 to 34 m. Water from 2 m above the bottom was pumped on board the research ship and then through a gas-liquid contactor. Volatile compounds transferred to the gas phase were passed to the gas chromatograph. The gas chromatographic technique used permits the detection of the entire spectrum of volatile sulfur compounds and, at least for hydrogen sulfide, is considerably more sensitive than the usual wet chemical methods. Although significant peaks were found for hydrogen sulfide, peaks for other sulfur compounds were not clearly evident. Assuming an equilibrium distribution of hydrogen sulfide between gas and liquid phases in the contactor, the concentration of total sulfide dissolved in the bottom water was estimated at 0.03-0.08 microM. The bottom water was partially depleted of dissolved oxygen and contained a small population of sulfate reducers (Desulfovigrio desulfuricans). (Snyder-FIRL)
W77-00620

SELF-MONITORING PROCEDURES: BASIC LABORATORY SKILLS,
Charles County Community Coll., LaPlata, Md.
C. M. Schwing.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 919, $5.50 in paper copy, $3.00 in microfiche. Report EPA-430/1-75-008, June, 1975. 131 p, 3 fig, 13 tab, 19 ref.

Descriptors: *Waste water treatment, *Pollutant identification, *Analytical techniques, *Treatment facilities, Mathematics, Effluents, Measurement, Microbiology, Engineering education, Volumetric analysis, Laboratory equipment, Education, Chemicals, Sanitary engineers, Bacteria, *Monitoring.

This Basic Laboratory Skills course is designed for treatment plant operators or technicians who must monitor effluent discharges under a National Pollutant Discharge Elimination System (NPDES) permit and who have little prior laboratory experience. The instructor's manual contains all the instructional package worksheets for presenting the course. The mathematical material includes whole numbers, decimals, the metric system, percentage, and formulas. The chemical laboratory material contains such applications as weighing, techniques, laboratory equipment use, and preparing and standardizing reagents. Basic microbiological techniques are also introduced. (Snyder-FIRL)
W77-00624

INSPECTION MANUAL FOR THE ENFORCEMENT OF NEW SOURCE PERFORMANCE STANDARDS: SEWAGE SLUDGE INCINERATORS,
PEDCo-Environmental, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 5G.
W77-00627

MAINTENANCE MANUAL: INSTRUCTIONS FOR SENSOR CLEANING AND FIELD CALIBRATION. THE POTOMAC RIVER WATER POLLUTION MONITORING SYSTEM,
Federal Water Pollution Control Administration, Cincinnati, Ohio. Div. of Pollution Surveillance.
A. F. Mentink.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 783, Price codes: A03 in paper copy, A01 in microfiche. September, 1966. 31 p, 3 append.

Descriptors: *Pollutant identification, *Analytical techniques, *On-site data collections, *Automation, *Automatic control, Water quality, *Maintenance, *Instrumentation.

A very important, but underemphasized, aspect of automatic acquisition systems for water quality data is maintenance of field instrumentation. The sensitivity of the electrodes decreases as contaminants accumulate on them. The more rigorous and disciplined the program of maintenance, the higher the probability of getting useful and valid data. Instructions for first-level maintenance (sensor cleaning and field calibration) are covered. The parametric systems discussed include pH, conductivity, dissolved chlorides, dissolved oxygen, oxidation-reduction potential, solar radiation intensity, and temperature. (Snyder-FIRL)
W77-00629

A SIMPLE TUBE-TYPE WATER PROFILE SAMPLER,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
R. G. Gilbert, and J. B. Miller.
Water Resources Research, Vol. 12, No. 4, p 812-815, August 1976. 1 fig, 3 tab, 5 ref.

Descriptors: *Instrumentation, *Sampling, *Plastics, Farm ponds, Irrigation canals, Lakes, Ponds, Dissolved oxygen analyzers, Chemical analysis, Tubes, Water sampling, Agriculture, Pollutant identification.
Identifiers: *Water profile sampler, *Plexiglass sampler, Recreational lakes, Dissolved oxygen profiles, Biological analysis, Tube-type sampler, Surface water sampling.

A plexiglass tube-type water profile sampler was designed for use in relatively shallow bodies of water, such as farm ponds, small recreational lakes, irrigation canals, and the surface 2 m of larger lakes and rivers. The sampler was a plexiglass tube with holes drilled at intervals (side ports) corresponding to water layers which were to be sampled. To obtain a water sample, the tube (open at both ends and with the side ports closed) was gently lowered vertically into the water. With the top stoppered, the tube was raised and its bottom stoppered just under the water surface. While the tube was held vertically, the water profile samples were rapidly and easily obtained after removing the top stopper and successively collecting from top to bottom the water sample from each side port. Dissolved oxygen (DO) profiles of the ponds measured with an oxygen probe directly in the ponds were similar to DO profiles of water samples collected with the tube sampler. Chemical and biological analyses of water samples obtained with the tube-type sampler and two other standard type water samplers (Kemmerer and Van Dorn) were compared. The analyses revealed that similar relative results were obtained from water samples collected with all three samplers, but the tube-type sampler was more desirable for obtaining water profile samples because of its simplicity of design and operation especially in small ponds. (Roberts-ISWS)
W77-00641

MANGANESE IN NARRAGANSETT BAY,
Rhode Island Univ. Kingston. Graduate School of Oceanography.
W. F. Graham, M. L. Bender, and G. P. Klinkhammer.
Limnology and Oceanography, Vol. 21, No. 5, p 665-673, September 1976. 5 fig, 5 tab, 22 ref. EPA R803243-01-0.

Descriptors: *Manganese, *Bays, *Sampling, Saline water-freshwater interfaces, Aluminum, Hydrogen ion concentration, Estuaries, Rivers, Sediments, Chemicals, Chemical precipitation, Adsorption, Metals, Suspended solids, Dissolved solids, Chemical analysis, Analytical techniques, Benthos, Pollutants, *Pollutant identification.
Identifiers: *Narragansett Bay(RI), Desorption.

Concentrations of dissolved manganese and particulate manganese and aluminum were determined in samples from Narragansett Bay, Rhode Island, and its surrounding rivers. Total manganese was approximately conservative, but dissolved and particulate manganese were not.

Desorption may occur in the tidal rivers at low salinities. Most riverine manganese was dissolved, but manganese in the bay was predominantly particulate, probably due to rapid manganese oxidation at bay water pH. The flux of dissolved manganese into bottom waters was about 2 + or - 1 micrograms/sq cm per day. Concentrations in bottom waters were high relative to surface waters. (Sims-ISWS)
W77-00642

ALIPHATIC HYDROCARBONS IN SEDIMENTS OF LAKE WASHINGTON,
Washington Univ., Seattle. Dept. of Chemistry.
S. G. Wakeham, and R. Carpenter.
Limnology and Oceanography, Vol. 21, No. 5, p 711-723, September 1976. 4 fig, 2 tab, 56 ref. ERDA E45-12225TA40.

Descriptors: *Sediments, *Organic compounds, *Oil, Pollutant identification, Chemical analysis, Gas chromatography, Sampling, Surveys, Analytical techniques, Lakes, Aging(Physical), Chemicals, Pollutants, *Lake sediments.
Identifiers: *Lake Washington(Wash), *Aliphatic hydrocarbons, Paraffins, Petroleum hydrocarbons, Radiocarbon dating.

The distribution of aliphatic hydrocarbons in sediments from several locations in Lake Washington was determined by gas chromatographic, radiocarbon, and stable carbon isotope analyses. Most surface sediments contained an average of about 1400 microgram/gram dry wt total aliphatic hydrocarbons, of which about 10 microgram/gram were n-paraffins. Gas chromatograms of these hydrocarbons and radiocarbon ages of about 18,000 years B.P. for the aliphatic hydrocarbon fraction suggested the presence of a large component of petroleum hydrocarbons. By contrast, sediments at depth in the sediment column and deposited before about 1880 contained only about 30 microgram/gram total aliphatics and about 5 microgram/gram n-paraffins. These hydrocarbon levels were believed to represent the aged natural background concentrations in Lake Washington. A number of cores analyzed in detail showed an increase in hydrocarbon levels after 1880, which corresponded to the start of a period of growth for the adjacent metropolitan area. (Sims-ISWS)
W77-00643

HYDROCHEMISTRY OF THE PARANA RIVER,
Instituto Nacional de Limnologia, Santo Tomo (Argentina).
For primary bibliographic entry see Field 2K.
W77-00644

AN INEXPENSIVE THERMISTOR FLOWMETER FOR AQUATIC BIOLOGY,
Duke Univ., Durham, N. C. Dept. of Zoology.
For primary bibliographic entry see Field 7B.
W77-00645

HEAVY METALS IN SOME NEW ZEALAND COMMERCIAL SEA FISHES,
Massey Univ., Palmerston North (New Zealand). Dept. of Chemistry, Biochemistry and Biophysics.
For primary bibliographic entry see Field 5C.
W77-00660

A DOUBLE BLIND TEST FOR DETERMINATION OF INTOLERANCE TO FLUORIDATED WATER: PRELIMINARY REPORT,
G. W. Grimbergen.
Fluoride. 7(3), p 146-152, 1974.

Descriptors: *Pollutant identification, *Fluoridation, *Flourides, Water pollution effects, Human diseases, Tests.

A double blind test for the detection of untoward effects from fluoridated water is described. Preliminary results with 60 patients out of a group of 300 indicate that certain individuals are intolerant to fluoride and reproducibly develop gastrointestinal symptoms, stomatitis, joint pains, polydipsia, headaches, and visual disturbances.--Copyright 1975, Biological Abstracts, Inc.
W77-00662

RESEARCH FOR THE DEVELOPMENT OF GUIDELINES FOR CONDUCTING AND ANALYZING AN ENVIRONMENTAL WATER QUALITY STUDY TO DETERMINE STATISTICALLY MEANINGFUL RESULTS,
Arkansas Univ., Fayetteville. Water Resources Research Center.
For primary bibliographic entry see Field 7B.
W77-00677

MEASUREMENT OF URBAN RUNOFF PETROLEUM,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Environmental Science.
For primary bibliographic entry see Field 5B.
W77-00678

EFFECT OF PRESCRIBED BURNING ON SEDIMENT, WATER YIELD, AND WATER QUALITY FROM DOZED JUNIPER LANDS IN CENTRAL TEXAS,
Texas Tech Univ., Lubbock. Dept. of Range and Wildlife Management.
For primary bibliographic entry see Field 4C.
W77-00679

A SENSITIVE ALGAL ASSAY: AN IMPROVED METHOD FOR ANALYSIS OF FRESHWATERS,
Connecticut Univ., Storrs. Inst. of Water Resources.
R. L. Klotz, J. R. Cain, and F. R. Trainor.
Journal of Phycology, Vol. 11, No. 4, p. 411-414, 1976. 1 fig, 6 tab, 10 ref.

Descriptors: *Cultures, *Oligothrophy, *Bioassay, Rivers, Nutrients, Methodology, Algae, Analytical techniques, Trophic level, *Pollutant identification, *Connecticut, Water analysis.
Identifiers: *Luxury uptake, Willimantic River(Conn), Shetucket River(Conn).

An algal assay capable of detecting the carrying capacity of nutrient-poor rivers was developed. Two problems were eliminated. The first involved culture and preparation of test algal strains. When cells were inoculated into river water samples, growth was supported by nutrients in the sample and these carried-over intracellularly by the inoculum, inaccurately measuring growth. This was especially pronounced in nutrient-poor waters. The second problem concerned inoculum size. Nutrient-rich waters can support larger algal populations than normally found. With nutrient-poor waters and small inocula, time may be spent waiting for sufficient growth to occur to allow quantitation. If the inoculum is heavy, quantitation occurs after short-growth periods, but may overload carrying capacities of nutrient-poor samples, inaccurately indicating their ability to support indigenous flora growth. To eliminate nutrient carryover, growth medium was developed containing less than 4 mg/l total inorganic salts. The test organism, Selenastrum capricornutum (10,000 cells/l) was grown in sterile-filtered river water and transferred daily. Low initial cell numbers permitted more nutrients/cell. Daily transfer exposed samples to greater nutrient differences and provided greater sensitivity. After incubating a week, cells were counted and doublings/day determined. The method is a simple, precise, inexpensive, short-term test useful in studying freshwaters. (Buchanan-Davidson--Wisconsin)
W77-00719

CHEMICAL CHARACTERISTICS AND ACUTE TOXICITY OF FOAM ON TWO AERATED LAGOONS,
International Pacific Salmon Fisheries Commission, Cultus Lake (British Columbia). Sweltzer Creek Salmon Research Lab.
For primary bibliographic entry see Field 5C.
W77-00752

PROCEEDINGS OF THE THIRD FEDERAL INTER-AGENCY SEDIMENTATION CONFERENCE 1976.
Water Resources Council, Washington, D.C. Sedimentation Committee.
For primary bibliographic entry see Field 2J.
W77-00775

THE USE OF COLOR INFRARED PHOTOGRAPHY FOR THE DETERMINATION OF SUSPENDED SEDIMENT CONCENTRATIONS AND SOURCE AREAS,
Forest Service (USDA), Fort Collins, Colo. Arapaho-Roosevelt National Forest.
For primary bibliographic entry see Field 2J.
W77-00844

WATER RESOURCES OF THE ROCK RIVER WATERSHED, SOUTHWESTERN MINNESOTA,
Geological Survey, St. Paul, Minn.
For primary bibliographic entry see Field 7C.
W77-00848

GEOHYDROLOGY AND WATER SUPPLY, SHEYMA ISLAND, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 7C.
W77-00851

ANALYSIS OF HISTORICAL WATER-QUALITY DATA AND DESCRIPTION OF PLAN FOR A SAMPLING NETWORK IN CENTRAL AND SOUTHERN FLORIDA,
Geological Survey, Tallahassee, Fla.
D. A. Goolsby, H. C. Mattraw, A. G. Lamonds, D. V. Maddy, and J. R. Rollo.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 521, Price codes: A07 in paper copy, A01 in microfiche. Water-Resources Investigations 76-52, March 1976. 124 p, 33 fig, 15 tab, 19 ref.

Descriptors: *Water quality, *Data collections, *Network design, *Florida, *Surface waters, Water analysis, Regression analysis, Evaluation, Chemical properties, Biological properties, Nutrients, Trace elements, Pesticides, Planning, Pollutant identification.
Identifiers: *Central and Southern Florida, Kissimmee River, Lake Okeechobee, Everglades.

Historical water quality data from about 100 sampling stations on streams, canals and lakes in central and southern Florida were analyzed for areal and temporal variations in water quality, statistical measures of the data, relationships between water quality variables, and long term changes or trends in water quality. Included in the analysis were data on the major inorganic chemical constituents, temperature, nitrogen and phosphorus species, trace metals, pesticides, organic carbon and biochemical oxygen demand. Based on the results of the analysis, a network was designed which would provide data to meet six specific objectives: (1) water quality accounting, (2) areal assessments (3) detection of gross long-term trends, (4) detection of toxic and deleterious substances, (5) establish a limnological data base on lakes and (6) furnish data on chemical inputs from the atmosphere. (Woodard-USGS)
W77-00858

WATER RESOURCES OF THE WARM SPRINGS INDIAN RESERVATION, OREGON,
Geological Survey Portland, Oreg.
For primary bibliographic entry see Field 4A.
W77-00864

GEOLOGY AND GROUND-WATER RESOURCES OF CAMDEN COUNTY, NEW JERSEY,
Geological Survey, Trenton, N. J.
For primary bibliographic entry see Field 2F.
W77-00866

SOURCES OF ARSENIC IN STREAMS TRIBUTARY TO LAKE CROWLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W77-00867

ACCUMULATION AND DISTRIBUTION OF SELENIUM IN MUSSEL AND SHRIMP TISSUES,
International Lab. of Marine Radioactivity Monte Carlo (Monaco). Oceanographic Museum.
For primary bibliographic entry see Field 5C.
W77-00873

SEASONAL AND LABORATORY VARIATIONS IN THE HEALTH OF GRASS SHRIMP PALAEMONETES PUGIO: DODECYL SODIUM SULFATE BIOASSAY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
For primary bibliographic entry see Field 5C.
W77-00884

THE RELATIONSHIP OF MALATHION AND ITS METABOLITES TO FISH POISONING,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5C.
W77-00885

INVESTIGATIONS INTO THE VERTICAL DISTRIBUTION OF ORGANISMS AND CHEMICAL SUBSTANCES IN THE GROUNDWATER IN VALLEYS AND TERRACES: METHODS AND FIRST RESULTS, (IN GERMAN),
Max-Planck-Institut fuer Limnologische Schlitz (West Germany). Limnologische Flusstation.
S. Husmann.
Int J Speleol 6(4), p 271-302, 1975.

Descriptors: Distribution, *Spatial distribution, *Groundwater, Infiltration, *Chemical wastes, *Water pollution sources, *Pollutant identification.
Identifiers: *Organisms, *River Dulda valley(W Germany), *River Wester(W Germany).

In the alluvial ground of the River Dulda valley and in the dilluvial terrace of the River Wester (West Germany) tubes of various lengths were sunk into sand and gravel to sample groundwater of different depths. These groundwater pump stations were installated with the aid of an apparatus for drilling bore-holes and by ramming in the pump tubes with a pneumatic hammer. The 1st biological and chemical investigations in these subterranean water research stations indicated that the vertical distribution of groundwater organisms and chemical substances in special cases may depend on the nature of subterranean water currents and the infiltration of polluted water into the sandy and gravelly soils of valleys and terraces.--Copyright 1976, Biological Abstracts, Inc.
W77-00919

ERAMS SURFACE AND DRINKING WATER COMPONENTS, JANUARY--MARCH 1974.
Office of Radiation Programs, Las Vegas, Nev.
Radiation Data and Reports, Vol 15, No 8, p 502-05 Aug 1974. 4 p, 2 fig, 3 tab, 1 ref.

Descriptors: *Water sampling, *Surface waters, *Potable water, *Radioactivity, *Administrative agencies, Gamma rays, Nuclear wastes, Public health, Radiation, Water pollution effects, Human population, Environmental effects, Analysis, Radioactivity effects, Tritium.
Identifiers: *Radiation data, Environmental radiation ambient monitoring system.

The Environmental Radiation Ambient Monitoring System (ERAMS) began in 1973. It was developed from previously operating monitoring networks to form a single system more responsive to current and projected sources of environmental radiation. The ERAMS Surface and Drinking Water Components consists of 76 drinking water samples taken quarterly from major population centers and selected nuclear facility environs. The radiation data thus assembled include analyses of: (1) tritium on a quarterly basis; (2) gamma scan, gross alpha and beta radioactive measurements annually; and (3) an annual composite for plutonium 238 and 239. The Surface Water Component consists of 55 quarterly surface water samples taken downstream from nuclear facilities or at background stations. A table presents the tritium concentrations in drinking water at selected stations for January-March 1974. Also examined here are the methods by which radiation doses may be determined and the various formulas utilized. (Lauer-Florida)
W77-00954

RADIOACTIVITY IN KANSAS SURFACE WATERS, JANUARY--DECEMBER 1972.
Kansas State Board of Health, Topeka. Radiation Control Section.
Radiation Data and Reports, Vol 15, No 8, p 500-01 Aug 1974. 2 p, 1 fig 1 tab.

Descriptors: *Data collections, *Kansas, *Surface waters, *Radioactivity, *Administrative agencies, Public health, Recreation, Missouri River, Nuclear wastes, Radiation, Nuclear reactors, Gamma rays, Sewage disposal, Water pollution effects, Water sampling, Industrial wastes.
Identifiers: *Radionuclides, Radiation data.

Monitoring the levels of radioactivity in Kansas surface waters is important since both present and future potential use for domestic, recreational, and industrial purposes may be effected. The Radiation Control Section of the Kansas State Department of Health collects liter samples every month at designated locations. The samples are then analyzed for gross alpha and beta radioactivity and scanned for specific radionuclides. The report discusses the analytical procedures used and illustrates the gross alpha and beta radioactivity in Kansas surface waters through one figure and two graphs. The report further states that radioactivity in the surface waters may consist of natural radioactivity picked up by flowing streams, radioactivity from sewage discharge, contributions from industrial sources, and fallout. (Lauer-Florida)
W77-00955

NONPOINT POLLUTION AND WATER QUALITY MONITORING,
Georgia Univ., Athens. Inst. of Community and Area Development, and Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 5G.
W77-00960

OF PCB PPMS FROM GE AND A SNAFU FROM EPA AND DEC,
R. Boyle.
Audobon, Vol 77, p 127-33, November 1975. 7 p.

Descriptors: *Polychlorinated biphenyls, *Aroclors, *DDT, *Chlorinated hydrocarbon pesticides, *Pollutants, Water pollution, Water pollution sources, Industrial wastes, Industrial production, Chemical wastes, Chemicals, Chemical industry, Wastes, Water quality, Fish, Water pollution effects, Water quality standards.

PCB's, or polycholorinated biphenyls, have been shown to produce adverse effects when taken into the human body through the food chain. Studies in Japan have produced evidence of severe acne, cheeselike discharges from the eyes, skin darkening, hearing loss, and other nuerological disorders. In addition, a number of newborn infants had abnormal skin pigmentation, still births were above the national average, and the majority of fetuses studied were smaller than the national standard. As a result of this study, Japan has banned the chemical. PCB's continue to be used in the United States, however, in adhesives for envelopes and tapes, waterproofing of canvas, plastic bottles, caulking compounds, and numerous other products and processes. At the present time abnormally high amounts of PCB's are being dumped into the Hudson River by General Electric. Efforts to reduce or halt their use have not been overly successful. Hudson River bass and Lake Ontario salmon have since been declared nonedible by the New York Department of Environmental Conservation. Such adverse effects have not been unusual. For example, the shrimp and oyster business was seriously damaged in Northwest Florida waters by high levels of PCB's released by a large textile industry. To prevent such adverse effects in the future, conservation groups are attempting to stop the introduction of PCB's into public waterways. (Frank-Florida)
W77-00978

SHIGELLA RESEARCH IN THE SEA AND IN AN ESTUARY: I. FREQUENCY OF BACTERIOPHAGES IN POLLUTED WATER, (IN FRENCH),
Institut Royal des Sciences Naturelles de Belgique, Brussels.
For primary bibliographic entry see Field 5B.
W77-01020

SHIGELLA RESEARCH IN THE SEA AND IN AN ESTUARY: II. ATTEMPT TO INHIBIT THE ADSORPTION OF SHIGAPHAGES AND STUDIES OF SHIGELLA ON A SELECTIVE MEDIUM, (IN FRENCH),
Institut Royal des Sciences Naturelles de Belgique, Brussels.
For primary bibliographic entry see Field 5B.
W77-01021

SHIGELLA RESEARCH IN THE SEA AND IN AN ESTUARY: III. IN VITRO DETERMINATION OF THE SURVIVAL TIME OF SHIGELLA SONNEI YCD IN SEA WATER, (IN FRENCH),
Inst. R. Sci. Nat. Belg., Bruxelles, Belg. Institut Royal des Sciences Naturelles de Belgique, Brussels.
For primary bibliographic entry see Field 5B.
W77-01022

SANITARY AND HYGIENIC EVALUATION OF THE QUALITY OF UNDERGROUND DRINKING WATER, (IN RUSSIAN),
Municipal Sanitary Epidemiology Station, Zhukovskii (USSR)
For primary bibliographic entry see Field 5B.
W77-01023

A POLAROGRAPHIC METHOD FOR THE DETERMINATION OF METALS IN WASTE WATERS, (IN ITALIAN),
Florence Univ. (Italy). Inst. of Chemical Analysis.
G. Piccardi, P. Cellini, and Legittimo.
Ann Chim 64(1/2); p 1-6, 1974.

Descriptors: *Pollutant identification, *Polographic analysis, *Metals, Analytical techniques, Sewage, Water pollution.

A polarographic method for the qualitative and quantitative determination of some metals in foul waters and sewage waters is proposed and discussed. The organic substances, after the evaporation of the sample, are destroyed by a slow digestion with nitric and perchloric acid; to the residue a volume of water containing the supporting electrolyte, 10 times smaller than that of original sample, is added. By this way concentrations below 0.1 mg/l in the original sample may be determined.--Copyright 1976, Biological Abstracts, Inc.
W77-01026

HYGIENIC INVESTIGATIONS OF A CASE OF RIVER POLLUTION BY CHEMICAL PLANT WASTEWATERS, (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W77-01027

LIPID TRANSFORMATION IN SEAWATER BY OIL-OXIDIZING MICROORGANISMS, (IN RUSSIAN),
Institute of Biology of the Southern Seas, Sevastopol (USSR). Dept. of Marine Sanitation Hydrobiology.
O. G. Mironov, and T. L. Shchekaturina.
Biol Morya (Vladivost) 2, p 58-63m 1975.

Descriptors: *Lipids, Microorganisms, Bacteria, Sea water, *Chromatography, Plankton, Detritus, *Pollutant identification.
Identifiers: Acartia-clausi, Centropages-pontica, Oithona-minuta, Polychaete, *Oil-oxidizing microorganisms, Barnacles.

Thin-layer chromatography was used to study the transformation of lipids of planktonic detrituis in seawater. Natural microflora and pure cultures of oil-oxidizing microorganisms isolated from seawater effect lipid fractions differently. (Bacteria, polychaetes, barnacles, bivale larvae and Acartia clausi, Centropages pontica and Oithona minuta are discussed.)--Copyright 1976, Biological Abstracts, Inc.
W77-01030

ENZYMATIC IN SITU MEASUREMENTS: NEW SEAWATER AND SEDIMENT MEASUREMENT METHODS, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskude.
T. Gradl.
Kiel Meeresforsch 30(1), p 1-11, 1974.

Descriptors: *Enzymes, Metabolism, Sediments, Measurement, Bacteria, *Electrodes, Phosphorus, Ureas, Ammonia, Color, Sea water, Pollutant identification.
Identifiers: Dehydrogenase, Electode, Enzymatic measurement.

A percolator was constructed to continuously measure metabolic processes in sediments. A continuous flow of water penetrates the sediment. O2 can be excluded. Continuous polarographic control or control with enzyme electrodes is possible. Gases evolved by metabolism can be trapped. An attempt to discriminate bacterial and purely enzymatic processes (free enzymes) by addition of chloroform or toluence (both lethal for bacteria) was unsuccessful. Enzyme electrodes were constructed as a probe for sediments, for the percolator and for the free water. The enzyme electrodes permit the determination of the ratios of Pi/organic P, urea/ammonia, and glycosidically bound glucose/free glucose. The enzyme is coupled to a diazotized anilin resin fixed on a metal electrode as a thin layer. The potentials (measured against Ag-AgCl) correlate with the ratio of the concentrations of substrate and product. Absolute measurements can be performed. The electrodes are calibrated in Tris-HCl-buffer solutions of pH S. To study the fine strucure of sediments, matrix bound color reactions are used. The matrices are fixed to glass slides. Glucose is bound glycosidically to an epoxy resin. After exposition the remaining glucose is measured by a color reaction. Dehydrogenases are detected by 2, 3, 5-triphenyltetrazolim-chloride fixed to a matrix by sprying with a teflon aerosol. The yellow formazan color is measure. H2S is detected by lead acetate which is enclosed in the cells of a dried emulsion. The walls are permeable for gas (H2S), but not for the insoluble reaction product. All reactions are calibrated in Tris-HCl-buffer solutions of pH 8.--Copyright 1976, Biological Abstracts, Inc.
W77-01031

MIXED FUNCTION MONOOXYGENASE OF FISH AS AN INDICATOR OF POLLUTION OF AQUATIC ENVIRONMENT BY INDUSTRIAL EFFLUENT,
Oulu Univ. (Finland). Dept. of Pharmacology.
For primary bibliographic entry see Field 5C.
W77-01065

5B. Sources Of Pollution

HYGIENIC PROBLEMS OF THE FORMATION AND PREDICTION OF CHANGES OF GROUNDWATER QUALITY IN THE CASE OF RECHARGING FROM SURFACE WATER SOURCES, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
Y. V. Novikov, and G. V. Gus'Kov.
Gig Sanit 4, p 74-78, 1975.

Descriptors: *Water quality standards, Water pollution, *Groundwater, *Artificial recharge, Public health, *Self-purification.

The degree of self-purification and prediction of groundwater quality in the case of artificial recharge are determined by many factors, including the composition and properties of water arriving at the infiltration plants. The use of polluted surface waters for recharging can decrease the effectiveness of the method and lead to groundwaters not meeting the hygienic standards.--Copyright 1976, Biological Abstracts, Inc.
W77-00528

AN INVESTIGATION INTO THE EFFECT AND CAUSE OF EUTROPHICATION IN GEORGETOWN LAKE, MONTANA,
Montana State Univ., Bozeman. Water Resources Research Center.
For primary bibliographic entry see Field 5C.
W77-00536

DEVELOPMENT OF A SYSTEM TO DETECT AND MONITOR SEDIMENT POLLUTION,
Rhode Island Univ., Kingston. Dept. of Civil and Ocean Engineering.
V. A. Nacci.
Available from the National Technical Information Service, Springfield VA 22161, as PB-259 265, Price codes: A02 in paper copy, A01 in microfiche. Completion Report, (1976). 19 p, 5 fig, 3 tab, 11 ref. OWRT A-055-RI(1). 14-34-0001-5040.

Descriptors: Soils, *Resistivity, Metals, Sediments, Trace elements, *Monitoring, Pollutant identification, *Sediment distribution, Cores, Sampling, Path of pollutants, *Rhode Island.
Identifiers: *Sediment pollution(Offshore), *Narragansett Bay(RI).

A system to monitor sediment pollution is presented. A modified electrical resistivity device was used to study laboratory and offshore sediment pollution. In the laboratory, several different soil type saturated in a simulated sea water with or without different pollutants, including soap, fertilizer, pesticide, paint, and fuel oil were used for investigation. The laboratory study results indicated that the presence of the pollutants resulted in a considerable change in the electrical resistivity of the sediment. A field electrical resistivity study gave sediment pollution distribution in good agreement with that obtained from laboratory analysis of core samples. Results indicated that the electrical resistivity device can provide a quick and economical way of monitoring pollution in marine sediments.
W77-00539

INFILTRATION LAGOONS FOR TERTIARY TREATMENT OF STABILIZATION POND EFFLUENT,
South Dakota State University, Brookings. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-00540

DENITRIFICATION WITH A BACTERIAL DISC UNIT,
National Inst. for Water Research, Pretoria (South Africa).
For primary bibliographic entry see Field 5D.
W77-00550

ON RADIOACTIVE WASTE MANAGEMENT: AN ANALYSIS OF THE PARAMETERS CONTROLLING SUBSURFACE CONTAMINANT TRANSFER,
Alberta Univ., Edmonton. Dept. of Geology.
F. W. Schwartz.
Journal of Hydrology, Vol. 27, p 51-71, 1975. 9 fig, 12 equ, 15 ref.

Descriptors: *Radioactivity, *Radioactivity effects, *Model studies, Soil water movement, *Path of pollutants, Soils, Water pollution sources.
Identifiers: *Radioactivity transfer.

The problem of subsurface, radioactive-contaminant transfer is investigated theoretically through the development of a two-dimensional model which considers the simultaneous flow of water and mass. In addition to the well-known physical transport processes, convection and dispersion, the model treats radioactive decay and cation exchange which are two of the most important concentration attenuation processes. The influence of factors, which control the transport processes, on subsurface contaminant distributions is demonstrated through the simulation and analysis of a series of hypothetical cases. With respect to the physical transport processes, hydraulic conductivity, porous medium dispersivity and the location of the contaminant inflow zone are considered as controlling parameters. (Skogerboe-Colo St)
W77-00551

PHYSICAL FUNDAMENTALS OF THE MIXING OF SOLUTIONS OF POLLUTANTS AND SEWAGE IN POROUS MEDIA,
Gesellschaft fuer Strahlen- und Umweltforschung m.b.h., Neuherberg bei Munich (West Germany). Institut fuer Radiohydrometrie.
D. Klotz.
Water Research Vol. 9, No. 12, p 783-790, December 1975. 15 fig, 1 tab, 18 ref.

Descriptors: *Water quality, *Groundwater, Pollution, *Porous media, Sewage, Diffusion, Aquifer characteristics, *Mixing, *Path of pollutants.

The increasing danger of ground-water pollution by pollutants from the environment and by increasing amounts of sewage requires an examination of the mechanisms of distribution and trans-

port within the water-bearing stratum. Two mixing processes occur in the simultaneous propagation of two miscible liquids in a porous medium (water-bearing stratum): hydrodynamic dispersion and molecular diffusion. If a region of flow is marked in a liquid (ground-water) flowing through a porous medium with a further liquid (solution of pollutants, sewage) being miscible therewith, this marked region increases as regards its extension during the joint movement of the two liquids. A mixing of the 'marking substance' with the flowing liquid occurs, the decrease in concentration of the 'marking substance' being a measure for the degree of intermixture. (Skogerboe-Colo St)
W77-00554

URBAN SEDIMENT PROBLEMS: A STATEMENT ON SCOPE, RESEARCH, LEGISLATION, AND EDUCATION.
American Society of Civil Engineers, New York. Task Committee on Urban Sedimentation Problems.
Journal of the Hydraulics Division, Proceedings of ASCE, Vol. 101, No. HY4, p 329-340, April 1975. 1 tab, 7 ref.

Descriptors: *Sediments, *Sedimentation, Sediment control, Urban runoff, Urbanization.
Identifiers: *Urban sediments.

Present (1974) erosion control guidelines and technology indicate that: There are sufficient and varied erosion control guidelines available for use as models for local governments. Past implementation experience can provide valuable information to new programs and help avoid many initial problems. Evaluation of social and physical damages still remains a weak point in economic analyses of control systems. Existing technology is adequate to design urban erosion control systems; however, design criteria developed for agricultural areas should be reviewed for adequacy in each case until sufficient experience in urban areas is documented and evaluated. Guideline handbooks are meant to provide general locaal information and should not be used arbitrarily as final design manuals. Erosion control systems do not have to be 100% effective in reducing soil loss to be acceptable. Needed research for more useful erosion and sediment control should be focused in two general areas: on improving the application of rurally developed technology to the urban situation and on developing methods and criteria for evaluating social and physical costs of various control systems relative to alternative costs of allowing specific amounts of sediment into specific water bodies. (Skogerboe-Colo St)
W77-00556

MIGRATION OF SALT FROM FEEDLOT WASTE AS AFFECTED BY MOISTURE REGIME AND AGGREGATE SIZE,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
A. Amoozegar-Fard, W. H. Fuller, and A. W. Warrick.
Journal of Environmental Quality, Vol. 4 No. 4 p 468-472 October-December 1975. 2 fig, 6 tab, 14 ref.

Descriptors: *Salinity, *Return flow, *Feed lots, Water management, Water quality control, Soil moisture, *Farm wastes, Waste disposal, *Electrical conductance, Conductivity.
Identifiers: *Manure disposal.

The migration of salt from three different aggregate sizes of feedlot manure under three moisture regimes was evaluated. The three sizes were small (to pass a 40-mesh sieve), medium (0.9 cm in diameter, 2.25 cm in length), and large (4.8 cm in diameter, 2.6 cm in length). The three moisture regimes were: (1) 12 hours saturation, 12 hours drainage by gravity, this step was repeated five times; (2) 12 hours saturation, 12 hours drainage by gravity, 48 hours oven drying at 60C, also repeated five times; and (3) continuous leaching for 60 hours at a constant rate. After each 12 hour saturation period the leachates were collected and the electrical conductivity (EC), pH, and concentrations of K, Na, Ca, Mg, NH4, NO3, Cl, S, P, and eight trace elements determined. The EC of the leachate for the first saturation period was highest for the small-sized aggregates under all three moisture regimes (21. 3, 21.2, and 19.3 mmhos/cm, respectively) and the lowest for the large-sized aggregates under continuous leaching (8.3 mmhos/cm). During the later leaching periods, the EC of the leachate for the large aggregates was higher than the other two sizes. Continuous leaching resulted in a lower EC for the first and a greater EC for the later saturation periods compared to the other two treatments. As for the individual salts, the migration pattern for K, Na, S, and Cl was similar to that for EC, however, the pattern for the other ions was dissimilar. (Skogerboe-Colorado State)
W77-00558

VARIABLE NATURE OF CHEMICAL COMPOSITION OF SEWAGE SLUDGES,
Purdue Univ., Lafayette, Ind. Inst. of Environmental Health; and Purdue Univ., Lafayette, Ind. Agricultural Experimental Station.
For primary bibliographic entry see Field 5A.
W77-00602

THE DELINEATION AND GROWTH OF A SLUDGE FIELD,
Institute of Oceanographic and Fisheries Research, Athens (Greece).
For primary bibliographic entry see Field 5C.
W77-00603

COMPLEXATION OF TRACE METALS BY ETHYLENEDIAMINETETRAACETIC ACID (EDTA) IN NATURAL WATERS,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5A.
W77-00604

MUNICIPAL WATERSHED MANAGEMENT SURVEY,
Southeastern Area State and Private Forestry, Atlanta, Ga.; and Geological Survey, Atlanta, Ga.
C. E. Dissmeyer, and W. T. Swank.
American Water Works Association Journal, Vol. 68, No. 2, p 97-100, February, 1976. 10 tab, 5 ref.

Descriptors: *Watershed management, *Land use, *Water quality, *Forest management, Streamflow, *Southeast US, Recreation facilities, Information exchange, Municipal wastes, Surface waters, Surveys, *Forest watersheds.

A general summary of survey data on the nature and extent of land uses, management problems, and information needs for municipal watersheds in the southeastern United States is presented, with particular emphasis on small and heavily forested watersheds.Currently, more than half of the small forested watersheds are either totally or partially closed to use. On the remaining watershed that are open, recreational activities are predominant, with some timber-management activities also being conducted. Major problem areas in watershed management include water quality problems and problems associated with water quantity and seasonal distribution of streamflow. The first problem was reported by 41% of the watershed managers surveyed, and the latter two problems were reported by 22% and 28%, respectively, of the managers surveyed. Information on the effects of forest management activities on the quantity and timing of streamflow does not appear to be reaching water supply managers despite its availability. Additional research is needed to more clearly define the impact of forest practices on water quality. (Kreager-FIRL)
W77-00608

WATER TEMPERATURE SIMULATION,
Hydrocomp, Inc., Palo Alto, Calif.
G. T. Lum.
Simulation Network Newsletter, Vol. 8, No. 3, 8 p, May, 1976. 5 fig, 2 tab.

Descriptors: *Simulation analysis, *Water temperature, *Heat transfer, *Water pollution effects, Rivers, Model studies, *Columbia River, Mathematical models, Advection, Methodology, Nuclear power plants.

The methodology of water temperature simulation is reviewed and applied to a case study. Simulation of water temperature is based on the use of an artificial control volume. Changes in the heat content of the control volume are due to internal sources, internal sinks, or transport of the heat across control volume boundaries. The general methodology is to evaluate each individual effect, then sum the effects to arrive at the net overall change in heat content of the control volume. Temperature simulation of river systems is greatly simplified by the absence of internal sources and sinks of heat. Changes in the heat content are due only to the transport process of advection, diffusion and dispersion, and heat transfer across the water surface. The representation of advected heat is easily done if the model contains flow-routing procedures. The accurate representation of diffusion and dispersion involves several complications; however, these two parameters can be assumed negligible relative to advection. Transport of heat across the air-water interface involves a number of different mechanisms which cannot be predicted adequately. The usefulness of water temperature simulation is illustrated by evaluating the effects of a proposed nuclear power plant on the downstream thermal regime of the Columbia River System. (Kreager-FIRL)
W77-00616

THE NONPOINT SOURCE POLLUTANT LOADING (NPS) MODEL,
Hydrocomp, Inc., Palo Alto, Calif.
Y. J. Litwin, and A. S. Sonigian, Jr.
Simulation Network Newsletter, Vol. 8, No. 4, 4 p, July 1976. 4 fig, 4 ref.

Descriptors: *Computer models, *Overland flow, *Water pollution sources, *Simulation analysis, Surface runoff, Urban runoff, Surface waters, Model studies, Watershed management, Waste loading.
Identifiers: *Nonpoint pollution sources.

A computerized model for simulating nonpoint source pollutant loading is described. The model continuously simulates the hydrologic processes, including pollutant accumulation, generation, and washoff from the land surface as well as snow accumulation and melt. The model is limited in the sense that only land surface contributions to nonpoint source pollution are evaluated. Subsurface and groundwater pollutants as well as channel processes are not considered. The model is concerned with the total loading or pollutant input to a stream channel or waterbody from the land surface; for water quality evaluations in watersheds where in-stream processes are significant, the model must be interfaced with stream water quality models. Sample results of simulating overland flow quantity and quality for an urban watershed are presented and indicate that the model provides a viable means for assessing land surface contributions of nonpoint pollutants. Calibration of certain model parameters is a necessary and critical step when applying the model to a particular watershed since the model is limited by simplifications due to incomplete descriptions of the processes controlling nonpoint pollution. (Kreager-FIRL)
W77-00617

COMPUTERIZED CITY-WIDE CONTROL OF URBAN STORMWATER,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.

For primary bibliographic entry see Field 5G.
W77-00634

NITROGEN TRANSFORMATIONS OF AMMONIUM SULFATE AND ALANINE IN SUBMERGED MAAHAS CLAY,
Philippines Univ., College. Coll. of Agriculture.
I. J. Manguiat, and T. Yoshida.
Soil Sci Plant Nutr. 19(2), p 95-102, 1973.

Descriptors: *Clays, *Denitrification, *Nitrification, Soil, *Aquatic soils, *Nitrogen, Sulfates, Asia, Path of pollutants, *Soil chemistry.
Identifiers: *Alinine, Ammonium sulfate, Maahas clay(Philipines).

The fate of added N in submerged soils was studied using 15N-labelled ammonium sulfate and alanine. After 8 wk of incubation at 25 and 22%, respectively, of N from ammonium sulfate and alanine were recovered in the soil. Under the experimental conditions used N added to presubmerged soils was lost rapidly outside of the soil-water system, regardless of whether the N was organic or inorganic. Fractionation studies revealed that the amount of tagged N incorporated into exchangeable ammonium, residual fractions, volatized as NH3 and chemically fixed N was not enough to account for the N loss. The N loss was attributed to nitrification and subsequent denitrification during the incubation period. The effect of N-Serve (2-chloro-6-(trichloromethyl) pyrimidine) on nitrification of 15N-labelled (NH4)2S04 in submerged soils was studied. About 15% more N was recovered from non-presubmerged soil, and less nitrate was accumulated in presubmerged soils where N-Serve coated (NH4)2S04 was applied, than from soils where (S4)2S04 was applied with N-Serve. Presubmerged soils provided a more favorable environment for nitrification than for denitrification under the experimental conditions used.--Copyright 1974, Biological Abstracts, Inc.
W77-00639

MANGANESE IN NARRAGANSETT BAY,
Rhode Island Univ. Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5A.
W77-00642

HEAT DISPERSION IN PHYSICAL ESTUARINE MODELS; REPORT 2, EXPERIMENTS IN THE DELAWARE RIVER MODEL,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
M. J. Trawle.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-021 952, Price codes: A07 in paper copy, A01 in microfiche. Research Report H-75-2, February 1976. 139 p, 109 fig, 4 tab.

Descriptors: *Model studies, *Heat, *Dispersion, *Delaware River, Hydraulic models, Powerplants, Thermal powerplants, Electric powerplants, Estuaries, Tides, Flow, Streamflow, Heat transfer, Temperature, *Thermal pollution, *Path of pollutants, Cooling water.
Identifiers: *Thermal plumes.

This report is the second of three to be published on the results of investigations of heat dispersion in physical estuarine models conducted in the Delaware River and Trinity Bay models for the Office, Chief of Engineers, U.S. Army. The results of this investigation indicated that the Delaware River physical model at the U.S. Army Engineer Waterways Experiment Station can be used effectively to predict the thermal plume characteristics from certain types of heated discharges into the Delaware Estuary. Specifically, the discharges investigated on the Delaware River were classified as low densimetric Froude number discharges, i.e., canals or low-exit-velocity pipe discharges. The near-field distortion effect was at a minimum in the model with this type of discharge. It was mentioned that no comparative tests of high densimetric Froude number discharges (diffusers) have been conducted in the model, and, therefore, it cannot be concluded from the investigation that the Delaware River model can adequately predict thermal plume characteristics for the latter-type discharge into the Delaware Estuary, nor are the results of this study readily transferable to other estuary models, especially those of dissimilar estuaries or those of different scales. (Sims-ISWS)
W77-00665

IMPROVING THE QUALITY OF WATER RELEASES FROM RESERVOIRS BY MEANS OF A LARGE DIAMETER PUMP,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
J. E. Garton, and C. E. Rice.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 548, Price code: A03 in paper copy, A01 in microfiche. Oklahoma Water Resources Research Institute, Stillwater, Completion Report, 1976. 34 p, 16 fig, 1 tab, 4 ref. OWRT C-5228(No. 4215)(1).

Descriptors: *Reservoir relases, *Pumps, *Pumping, Stratification, *Destratification, Water quality, Oxygen, Temperature, Reservoir operation, *Oklahoma, Lakes, Iron, Manganese, Dissolved soils, Ammonia, Hypolimnion.
Identifiers: *Lake Arbuckle(Okla), Axial flow pumps.

In temperate climates, many lakes stratify during the summer. A typical stratified lake will have a warm oxygen-rich epilimnion, a thermocline, and a colder oxygen depleted hypolimnion. High levels of iron, manganese, hydrogen sulfide, and ammonia and dissolved hydrocarbons may occur in the hypolimnion. Many efforts have been made to destratify lakes, primarily by air bubbling. These methods require large energy inputs. A low-energy destratifier using 42-inch propellers to pump the water downward from the surface has been used successfully to destratify a 100 acre lake (35 feet deep) for 3 years. This project was an attempt to apply the same kind of device to Lake Arbuckle, a 2400 acre, 90-feet deep lake in south central Oklahoma. A 16.5-foot aircraft propeller was used to pump approximately 200,000 gallons per minute downward. Although the lake stability index was decreased by half, a corresponding reduction in the oxygen distribution index did not occur until the fall overturn. Thus, a lake can be weakly stratified thermally and strongly stratified chemically. The fall turnover occurred about a month earlier and more completely than normal during two years of operation. The oxygen content in the outlet waters near the pump was increased 1 to 2 mg/L during the critical summer months. (See also W77-00669)
W77-00668

SEDIMENT CHARACTERISTICS AND THE TROPHIC STATUS OF FOUR OREGON LAKES,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
G. E. Davis, and G. L. Larson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 560, Price codes: A04 in paper copy, A01 in microfiche. Oregon Water Resources Research Institute, Corvallis, Completion Report WRRI-46, September 1976. 56 p, 11 fig, 10 tab, 64 ref. OWRT A-027-ORE(1).

Descriptors: Trophic level, *Paleolimnology, *Lakes, Sediments, *Eutrophication, *Lake sediments, *Oregon, Organic matter, Chlorophyll, Phosphorus, Nitrogen, Diatoms, Watersheds(Basins), Biodegradation, *Sedimentation rates, Indicators.
Identifiers: *Sedimentary chlorophyll degradation products, Waldo Lake(Ore), Odell Lake(Ore), Diamond Lake(Ore), Devil's Lake(Ore).

This study was undertaken to evaluate the usefulness of sediment records for correlating changes in the sediment characteristics of four Oregon lakes with past cultural developments of the lakes and their watersheds. The lakes were Waldo, Odell and Diamond Lakes located in the Cascade Mountains and Devils Lake located on the Oregon coast. Percentage dry weight, percentage organic matter, sedimentary chlorophyll degradation products (SCDP), total phosphorus, total organic nitrogen, and diatom assemblages were used as indices of sediment changes through time. Profiles of selected characteristics of the sediment cores reflected the events unique to each lake and its watershed.
W77-00673

AN AQUEOUS ENVIRONMENTAL SIMULATION MODEL FOR MID-SOUTH LAKES AND RESERVOIRS,
Arkansas Univ., Fayetteville. Coll. of Engineering.
For primary bibliographic entry see Field 5C.
W77-00675

MEASUREMENT OF URBAN RUNOFF PETROLEUM,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Environmental Science.
J. V. Hunter, S. L. Yu, and W. Whipple, Jr.
In: Urbanization and Water Quality Control, Proceedings No. 20, American Water Resources Association, Minneapolis, Minn., June 1975, p 162-168. 2 fig, 3 tab, 3 ref. Edited by W. Whipple, Jr.

Descriptors: Water quality, Water pollution sources, Oil pollution, *Oil wastes, *Measurement, Organic compounds, Effluents, Pennsylvania, Water analysis, Sampling, Treatment facilities, *Industrial wastes, Water pollution control.
Identifiers: *Urban runoff, *Nonpoint pollution sources, Philadelphia(Penn).

Interim results are presented for the measurement and analysis of petroleum hydrocarbons in urban runoff. Numerous samples were taken for analysis through the storm hydrograph. Runoff from a relatively clean Philadelphia neighborhood showed a weighted mean concentration of 2.63 mg/l. This compares with average content of 1.56 mg/l in several samples of treated petroleum refinery effluent. Projections indicate that when refinery treatment plants now planned are all operable, the urban runoff may have considerably more total petroleum content than the refinery effluent.
W77-00678

EXPERIMENTS TO INVESTIGATE SUBSTANTIAL LOAD OF SOILS AND TO PREDICT THE LONG TERM EFFECTS OF WASTES ON GROUND WATER, (IN GERMAN),
Ministry of Agricultural Experiment Station, Brunswick (West Germany).
N. El-Bassam.
Landwirtsch Forsch 28(3), p 175-182, 1975.

Descriptors: Percolation, Groundwater, Soils, Waste disposal, Path of pollutants, *Sewage disposal fields, *Soil contamination, Soil analysis, Migration, Electrical conductance, Heavy metals, Mineralogy.
Identifiers: Mineral content(Soils).

Percolation and migration experiments have been carried out since 1973 with and without radioactive isotopes on undisturbed soil column from sewage treated fields, to determine the mineral load of contaminated soils and to predict a possible long term effects of addition of wastes to soil on ground water. The electrical conductivity of the leached material from the contaminated soil columns indicated that it was higher (2.6 mmho/cm) than the control (0.05). The mineral contents NO2, NO3, P,

Cl, Na, K, Ca, Mg and the heavy metals Zn and Cd were higher. Results of soil analysis confirm results of the percolation experiments concerning substantial load. Under given experimental conditions, the Zn migration rate was 10.8 cm/yr.—Copyright 1976, Biological Abstracts, Inc.
W77-00703

THE ROLE OF SEDIMENT AS A MODIFYING FACTOR IN PESTICIDE-ALGAE INTERACTIONS,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W77-00713

SEASONAL FLUCTUATIONS OF DIELDRIN RESIDUES IN THE TISSUES OF THE MARSH CLAM, RANGIA CUNEATA, FROM A TEXAS ESTUARY,
Texas A and M Univ., College Station.
S. R. Petrocelli, J. W. Anderson, and A. R. Hanks.
Texas Journal of Science, Vol. 26, No. 3-4, p 443-448, 1975.

Descriptors: *Pesticide residues, *Fluctuations, *Dieldrin, *Clams, *Seasonal, *Texas, Commercial shellfish, Bioindicators, Path of pollutants, Water pollution effects.
Identifiers: Rangia cuneata, *Trinity Bay(Texas).

The marsh clam, Rangia cuneata, was collected in Trinity Bay, Texas, in 1970 and 1971 and analyzed for residues of the chlorinated hydrocarbon insecticide, dieldrin, by gas-liquid chromatography. Analysis was carried out on ten individual clams randomly selected, shucked, and frozen. Recoveries of dieldrin from fortified clam tissue samples were above 85%. Clams collected in October and December 1970 had lower residues of dieldrin (mean and standard deviations were 7.9 plus or minus 1.5 ppb and 6.8 plus or minus 1.1 ppb, respectively) than those for February, April, and July (mean and standard deviations were 16.4 plus or minus 2.8 ppb, 16.6 plus or minus 1.4 ppb and 14.8 plus or minus 1.8 ppb respectively), or at least twice the fall values. These seasonal fluctuations in insecticide residues in tissue may be due to changes in river flow into the bay, with maximum tissue levels in months of large freshwater input. Also maturation of gonads and production of gametes in the spring and summer may cause higher whole body insecticide residue levels during these periods. (Buchanan-Davidson--Wisconsin)
W77-00717

NUMERICAL MODELS OF LAKE CURRENTS,
Case Western Reserve Univ., Cleveland, Ohio.
W. Lick.
Report EPA-600/3-76-020, April 1976. 151 p. 61 fig., 80 ref. R-802359.

Descriptors: *Hydrodynamics, *Littoral, *Mathematical models, *Lakes, *Currents(Water), Water pollution, Dispersion, *Lake Erie, Water circulation, Storm surge, Thermal pollution, Spatial distribution, Effluents, Influent streams, Mixing, Diffusion, Model studies, *Path of pollutants.

To understand fundamental aspects of contaminant dispersion in near-shore regions of large lakes and realistically describe currents, numerical models were developed. One steady-state, constant-density model was applied to overall circulation in Lake Erie, circulation when partially ice-covered, and circulation in a near-shore area (including a proposed jetport), plus a two-layer stratified lake. A second model is time-dependent, constant-density, free-surface model, to describe storm surges and similar motions. It was applied to storm surges in Lake Erie and a near-shore area. The third model is a time-dependent, variable-density, rigid-lid model which was used on river discharges, thermal plumes, and overall and near-shore circulation in a stratified lake. Vertically averaged models, which were relatively simple but did not give details in the vertical of the flow and caused errors in small time and variable-depth situations were used for parametric studies, lake circulation problems, river discharges, and thermal plumes. There models are sufficiently accurate to be used as bases for models of sediment resuspension and transport, dredging, plankton growth, community succession, etc. These numerical models do not consider wave effects. (Buchanan-Davidson--Wisconsin)
W77-00722

WATER POLLUTION INVESTIGATION: MAUMEE RIVER AND TOLEDO AREA,
Enviro Central, Inc., Rockville, Md.
For primary bibliographic entry see Field 5C.
W77-00723

THE INFLUENCE OF LAND USE ON STREAM NUTRIENT LEVELS,
Corvallis Environmental Research Lab., Oreg. Eutrophication Survey Branch.
For primary bibliographic entry see Field 5C.
W77-00725

THE POTENTIAL CONTRIBUTION OF FERTILIZERS TO WATER POLLUTION,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Soils and Crops.
L. A. Douglas.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 609, Price codes: A05 in paper copy, A01 in microfiche. Water Resources Research Institute, Rutgers University, New Brunswick, N. J. Partial Completion Report, June 1976. 92 p, 50 fig, 16 tab, 45 ref. OWRT A-027-NJ(6). 14-31-0001-3830.

Descriptors: *Nitrates, *Nitrites, *Ammonia, *Phosphates, *Leaching, *Fertilizers, Land use, *New Jersey, *Denitrification, Nitrogen, Nutrients, Water pollution sources.
Identifiers: N-SERVE.

Field studies were undertaken to determine the magnitude of leaching of fertilizer N03, NH4 and P04. The effect of N-SERVE on these reactions was observed, N-SERVE had little effect on leaching because most leaching takes place during the fall and winter when precipitation exceeds evapotranspiration. No leaching of NH4 or P04 was observed. The common fertilizer efficiency measure of N in crop/N applied in fertilizer may be used as an indication of the amount of fertilizer N that will be leached. Studies of nutrients in streams were undertaken to relate land use to N03, NH4 and P04 concentrations in surface waters. Sewage treatment plants and 'illegal drains' were major sources of all three ions. In order of decreasing contribution of N03: urban land contributes more than cropland which contributes more than woodlands. Urban lands, croplands and woodlands contribute equal amounts of NH4 and P04 to streams. The 'background level' of P04 in central New Jersey streams is many times higher than the 0.01 ppm level often advocated. Although very high concentrations of N03 were found in the soil solution in the subsoil the concentration of N03 found in streams was rather low. Denitrification must be an active process in subsoils, and probably in the groundwater.
W77-00732

HYDRAULIC MODEL STUDIES OF NAVAJO DAM AUXILIARY OUTLET WORKS AND HOLLOW-JET VALVE BYPASS--MODIFICATIONS TO REDUCE DISSOLVED GAS SUPERSATURATION,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 8C.
W77-00739

EVALUATING IMPACT OF FOREST SITE PREPARATION ON SOIL AND WATER QUALITY IN THE U.S. GULF COASTAL PLAIN,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
D. C. McClurkin, and P. D. Duffy.
In: Forest Soils and Forest Land Management. Proceedings of the Fourth North American Forest Soils Conference, 1973, Quebec, p 315-321. 1975. 32 ref. Edited by B. Bernier and C. H. Winget.

Descriptors: *Forest management, *Water quality, Water quality standards, Watershed management, Soil physical properties, Coastal Plains, *Mississippi.
Identifiers: *Site preparation, *Site productivity, *Gulf Coastal Plain.

If projected U.S. timber needs of the year 2000 are to be met, at least 4 million hectares of bare or poorly stocked southern forest land must be planted with pine by 1985, and another 8 million hectares must be converted from low-grade hardwoods to pine. To meet these goals, land managers annually are drastically disturbing many thousands of hectares by tree crushing, brush chopping, disking, windrowing, bedding, burning, and chemical treatment to remove competing vegetation and prepare the soil for pine. Though evidence is limited, literature on past forest and agricultural practices resembling such intensive techniques indicates that there may be reason for concern. The environmental values at stake suggest research to determine (1) what significant changes in soil and water quality result from intensive forestry; (2) whether changes are adverse; and (3) if adverse, how practices can be modified to allow management for high yields without damaging impacts. Described are some of the considerations involved in such research, including initial survey and development of a sampling scheme. (Forest Service)
W77-00740

THE DILEMMAS OF SETTING SEDIMENT STANDARDS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W77-00806

NUTRIENTS LOST IN DEBRIS AND RUNOFF WATER FROM A BURNED CHAPARRAL WATERSHED,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W77-00810

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SEDIMENTS ORIGINATING FROM MISSOURI VALLEY LOESS,
Agricultural Research Service, Cheyenne, Wyo. North Central Region.
G. E. Schuman, R. F. Piest, and R. G. Spomer.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 3-28 - 3-40, 1976. 3 fig, 5 tab, 18 ref.

Descriptors: *Sediments, *Chemical properties, *Agricultural runoff, *Iowa, Nitrogen, Phosphorus, Carbon, Nutrients, Chemicals, Agricultural chemicals, Fertilizers, Erosion, Gully erosion, Rill erosion, Sheet erosion, Soil erosion, Loess, Soils, Suspended solids, Clays, Silts, Sands, Surface runoff, Sedimentation, Sedimentology.

Nitrogen (N) and phosphorus (P) associated with sediment in surface runoff accounted for at least 85% of N and P discharged from agricultural watersheds. The N and P content of the sediment was related to its carbon (C) content. At low flow,

the C concentration of the sediment increased, indicating the selectivity of the erosion process for organic material. The sediment showed an enrichment in the clay fraction over that contained in the surface soil, and this increase can result in a disproportionate increase in the discharge of those chemicals adsorbed to clay material. (See also W77-00775) (Sims-ISWS)
W77-00811

SEDIMENT-PHOSPHORUS RELATIONS IN SURFACE RUNOFF FROM IRRIGATED LANDS,
Agricultural Research Service, Kimberly, Idaho. Soil and Water Conservation Research Div.
D. L. Carter, M. J. Brown, and J. A. Bondurant.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 3-41 - 3-52, 1976. 8 tab, 11 ref.

Descriptors: *Sediments, *Phosphorus, *Irrigation, *Agricultural runoff, Erosion, Soil erosion, Nutrients, Irrigation practices, Suspended solids, Soils, Loam, Silts, Regression analysis, Chemicals, Chemistry, Sedimentation.

Phosphorus and sediment concentrations were measured in irrigation and drainage waters, and phosphorus and sediment inflows and outflows computed. Relationships between phosphorus and sediment were developed. Total phosphorus and orthophosphate concentrations measured in nonfiltered samples were closely related to the sediment concentration, but dissolved orthophosphate measured in samples filtered through 0.45 micrometer membrane filters was independent of the sediment concentration. A net sediment inflow was found on one large tract where sediment settles in drains and the amount of surface runoff is low, but a net sediment outflow was found for another tract with steeper drains and from which more surface runoff returned to the river. Net phosphorus inflows were measured on both tracts. Particle size segregation took place in irrigation and drainage waters whenever the flow velocity was slow enough to allow suspended sediment to settle, and the quantity of phosphorus per unit of sediment remaining suspended increased. Actually, much more phosphorus settles with that portion of the sediment that settles than remains in suspension where sediments are eroded from silt loam or loam soils. Thus, conditions favoring settling were phosphorus-conserving conditions. (See also W77-00775) (Sims-ISWS)
W77-00812

PESTICIDE CONCENTRATIONS AND YIELDS IN RUNOFF AND SEDIMENT FROM A MISSISSIPPI DELTA WATERSHED,
Agricultural Research Service, Baton Rouge, La.
G. H. Willis, L. L. McDowell, J. F. Parr, and C. E. Murphree.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 3-53 - 3-64, 1976. 5 fig, 2 tab, 7 ref.

Descriptors: *Pesticides, *Sediments, *Agricultural runoff, *Soil erosion, *Mississippi, DDT, DDE, Rainfall, Runoff, Erosion, Agricultural chemicals, Cotton, Crops, Farm management, Watersheds(Basins), Sediment yield, Regression analysis.
Identifiers: *Mississippi delta, Toxaphene, Trifluralin.

Pesticide concentrations were measured in runoff from a 15.6-ha (38.5-acre) watershed planted to continuous cotton. The watershed, consisting of Sharkey silty clay soil, had been formed for drainage with mean slopes of 0.2%. Measurements during 1973 and 1974 indicated a linear relationship between pesticide yields in runoff and sediment yields. Mean sediment yield was 27.6 metric tons/ha/year (12.3 tons/acre) when mean annual rainfall was 43.8 cm (17.2 inches) above the 30-year average of 125 cm (49.4 inches). Toxaphene, DDT, DDE, and trifluralin yields from the watershed in 1973, when no toxaphene or DDT was applied, were 117 (0.104), 87 (0.078), 7 (0.006), and 2 (0.002) g/ha (lbs/acre), respectively. Corresponding yields in 1974, when 10.08 kg toxaphene/ha (9 lbs/acre) were applied, were 97 (0.086), 27 (0.024), 6 (0.005), and 2 (0.002) g/ha (lbs/acre), respectively. In 1974, the mean annual concentrations of toxaphene, DDT, DDE, and trifluralin in runoff were approximately 11, 3.1, 0.6, and 0.2 microgram/liter (ppb). These sediment and pesticide yields are probably higher than would be expected in a year of normal rainfall amount and distribution. The data indicated the need, however, for improved erosion control practices on flat lands in the Delta to reduce the loss of valuable topsoil and to reduce pollution hazards from both sediment and farm chemicals. (See also W77-00775) (Sims-ISWS)
W77-00813

ROLE OF THE SEDIMENTATION IN THE SELF-PURIFICATION OF THE SCHELDT ESTUARY,
Laboratoire de Recherches Hydrauliques, Antwerp (Belgium).
J. J. Peters, and R. Wollast.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 3-77 - 3-86, 1976. 6 fig, 2 ref.

Descriptors: *Estuaries, *Sedimentation, *Pollutants, *Belgium, Heavy metals, Water pollution, Path of pollutants, Salinity, Sediments, Bottom sediments, Nutrients, Diatoms, Oxygen, Organic matter, Turbidity, Suspended solids, Rivers, Saline water-freshwater interfaces, *Self purification.
Identifiers: *Scheldt Estuary(Belgium).

The hydrographic basin of the Scheldt River covers a heavily populated and industrialzed region and drains waters extremely polluted due to uncontrolled discharges. In this partially stratified estuary, the mixing process of fresh and salt water is responsible for an important deposition of the suspended load of the river in a restricted area corresponding to the harbor of Antwerp. This important shoaling is explained by the physico-chemical properties of the suspended matter and the hydrodynamical characteristics of the estuarine region. Taking into account the physical characteristics of the Scheldt, the estuary was divided into two zones: an upper one from km 100 to km 55 and a lower one from km 55 to the mouth. Four times a year fixed stations situated at the boundaries of these regions were managed during 5 days; hourly samples were taken at three depths and continuous measurements of the profile of the currents along a vertical were performed. A longitudinal survey was also executed monthly, following the low tide from the mouth to km 130. Approximately 50 surface samples were collected during each survey. The mechanisms and characteristics of the mud deposition and their influence on the mass-transport, the accumulation, and the transformation of some typical elements in the estuarine zone of the Scheldt were presented. Observations over three years enabled the annual mass balances of input, transport, and accumulation by sedimentation of various pollutants in the two estuarine regions to be estimated. The role of the sediments on the oxygen budget was deduced from the previous mass-balances. Large concentrations of nutrients persisted in the brackish water zone where oxygen was available and turbidity was low. As a consequence, this zone was eutrophied and diatom blooms were frequent. (See also W77-00775) (Sims-ISWS)
W77-00815

SEDIMENT DISPERSAL IN WESTERN LAKE MICHIGAN NEAR TWO CREEKS, WISCONSIN, AND THE INFLUENCE OF AN INDUSTRIAL COOLING WATER DISCHARGE,
Wisconsin Univ., Madison. Sea Grant Program; and Wisconsin Univ., Madison. Geo-Environmental and Mineral Resources Program.
For primary bibliographic entry see Field 2J.
W77-00841

SIMULATION OF DISSOLVED OXYGEN AND BIOCHEMICAL OXYGEN DEMAND PLANTATION CANAL, BROWARD COUNTY, FLORIDA, WITH AN EVALUATION OF THE QUAL-I MODEL FOR USE IN SOUTH FLORIDA,
Geological Survey, Tallahassee, Fla.
T. N. Russo, and R. S. McQuivey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 375/, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 59-75, December 1975. 49 p, 15 fig, 7 tab, 13 ref.

Descriptors: *Mathematical models, *Dissolved oxygen, *Biochemical oxygen demand, *Canals, *Water quality control, Reaeration, Sewage effluents, Photosynthesis, Water management(Applied).
Identifiers: *Plantation canal(Fla), *Broward County(Fla).

A mathematical model; QUAL-I, developed by the Texas Water Development Board, was evaluated as a management tool in predicting the spatial and temporal distribution of dissolved oxygen and biochemical oxygen demand in Plantation Canal. Predictions based on the QUAL-I model, which was verified only against midday summer-flow conditions, showed that improvement of quality of inflows from sewage treatment plants and use of at least 130 cubic feet per second of dilution water would improve water quality in the canal significantly. The model was not fully amenable to use on Plantation Canal because: (1) it did not consider photosynthetic production, nitrification, and benthic oxygen demand as sources and sinks of oxygen; (2) the model assumptions of complete mixing, transport, and steady state were not met; and (3) the data base was inadequate because it consisted of only one set of data for each case. However, it was felt that meaningful results could be obtained for some sets of conditions. (Woodard-USGS)
W77-00852

SOURCES OF ARSENIC IN STREAMS TRIBUTARY TO LAKE CROWLEY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
L. A. Eccles.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 856, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 76-36, June 1976. 39 p, 6 fig, 9 tab, 21 ref.

Descriptors: *Water pollution sources, *Trace elements, *Water quality, *Hot springs, *California, Water analysis, Surface waters, Lakes, Chemical analysis, Water chemistry, Geochemistry, Geothermal studies, Path of pollutants, Water supply, Public health.
Identifiers: *Arsenic, *Lake Crowley(Calif), Los Angeles(Calif).

Lake Crowley is the largest single source of water for the city of Los Angeles. More than 50 percent of the water entering the Los Angeles-Owens River aqueduct flows through Lake Crowley. Arsenic enters Lake Crowley primarily from hot springs in Long Valley. Sixty percent of the arsenic discharged to Lake Crowley is from hot springs in Hot Creek Gorge. The hot-spring water containing about 1,000 micrograms per liter of arsenic blends with the water flowing in the creek and is usually diluted to a concentration of about

200 micrograms per liter; additional dilution occurs downstream. About 75 percent of the arsenic in Hot Creek is discharged from only two springs. The remaining sources of arsenic in the gorge are poorly defined seepage and flow from numerous small springs. Other sources of arsenic in Long Valley are from either high volume and low-arsenic concentration springs, such as the springs at Hot Creek Fish Hatchery, or high-concentration and low-volume springs, such as those found in the vicinity of the Alkali lakes. These other sources individually are small in comparison with the source in Hot Creek Gorge. It is unlikely that arsenic from these sources could cause the arsenic concentration in Lake Crowley to exceed the Environmental Protection Agency's recommended criterion (limit) for public water supply. (Woodard-USGS)
W77-00867

HYDRAZINE DEGRADATION IN AQUATIC SYSTEMS,
Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 5C.
W77-00879

SEDIMENT MOVEMENT INDUCED BY SHIPS IN RESTRICTED WATERWAYS,
Texas A and M Univ., College Station. Ocean Engineering Program.
For primary bibliographic entry see Field 2L.
W77-00886

INFLUENCE OF THE SUPRAMOLECULAR MARINE ENVIRONMENT ON PITTING CORROSION,
Texas A and M Univ., College Station. Ocean Engineering Program.
For primary bibliographic entry see Field 8G.
W77-00890

REPORT TO THE CONGRESS ON OCEAN DUMPING RESEARCH, JANUARY THROUGH DECEMBER 1975.
National Oceanic and Atmospheric Administration, Washington, DC.
For primary bibliographic entry see Field 5G.
W77-00892

MARINE POLLUTION ARTICLES IN THE LAW OF THE SEA SINGLE INFORMAL NEGOTIATING TEXT,
Rhode Island Univ., Kingston. Law of the Sea Inst.
For primary bibliographic entry see Field 5G.
W77-00894

INVESTIGATIONS INTO THE VERTICAL DISTRIBUTION OF ORGANISMS AND CHEMICAL SUBSTANCES IN THE GROUNDWATER IN VALLEYS AND TERRACES: METHODS AND FIRST RESULTS, (IN GERMAN),
Max-Planck-Institut fuer Limnologische Schlitz (West Germany). Limnologische Flusstation.
For primary bibliographic entry see Field 5A.
W77-00919

MUNICIPAL PHOSPHORUS LOADINGS TO LAKE ERIE, AN EVALUATION STUDY PREPARED FOR THE GREAT LAKES WATER QUALITY BOARD.
International Joint Commission-United States and Canada, Windsor (Ontario). Great Lakes Water Quality Board.
December 1975. 40 p, 2 fig, 4 tab, append.

Descriptors: *Phosphorus, *Lake Erie, *Sewage effluents, Water pollution sources, Treatment facilities, Sludge treatment, Nutrient removal, Bypasses, Combined sewers, Storm water, Biochemical oxygen demand, Suspended solids, Michigan, Ohio, Indiana, Pennsylvania, Canada, *Organic loading.
Identifiers: *Phosphorus loadings, Ontario, Detroit(Mich), Cleveland(Ohio), Toledo(Ohio), Akron(Ohio), Erie(Ohio), Fort Wayne(Ind), Windsor(Ontario), London(Ontario), Kitchener(Ontario).

In an effort to determine the 1974 annual phosphorus loadings to Lake Erie, treatment plants in Detroit, Cleveland (Easterly, Southerly and Westerly), Toledo, Akron, Wyandotte, Erie, Fort Wayne, Windsor, London and Kitchener were visited and their operational efficiencies evaluated. Another objective was to assess the pollution loadings from plant bypasses and combined sewer overflows. The overall performance of each of the treatment plants in 1973 and 1974 is summarized and the average concentrations for phosphorus, BOD and suspended solids are shown. Seven of the 12 plants had not achieved the phosphorus concentration of 1 mg/l in their effluents despite the fact that they have installed phosphorus-removal facilities. Unmonitored sewage bypasses within the plants do not appear to constitute a significant portion of the phosphorus loading; there were insufficient quanitative data on combined sewer and stormwater overflows. The most frequent cause of operational problems experienced was inadequate sludge handling facilities but remedial actions were underway. When the targeted phosphorus reduction levels are achieved the total phosphorus loadings will be reduced from 18,000 to 5,700 kg/day, a decrease of almost 70%. (Auen-Wisconsin)
W77-00926

ASBESTOS IN THE GREAT LAKES BASIN WITH EMPHASIS ON LAKE SUPERIOR, A REPORT TO THE INTERNATIONAL JOINT COMMISSION FROM THE GREAT LAKES RESEARCH ADVISORY BOARD.
International Joint Commission-United States and Canada, Windsor (Ontario). Great Lakes Water Quality Board.
February 1975. 101 p, 14 fig, 15 tab, 36 ref, 5 append.

Descriptors: *Asbestos, *Lake Superior, Water pollution, Air pollution, St. Lawrence River, Great Lakes, International Joint Commission, Waste water treatment, Mineraology, Minnesota, Mining, Analytical techniques, Judicial decisions, Spatial distribution, Bottom sediments, Waste water(Pollution), Monitoring, Public health, Hazards.
Identifiers: *Reserve Mining Co., *Silver Bay(Minn), Duluth(Minn), Taconite mining.

Beginning with a description of asbestos properties and its analytical enumeration and identification, asbestos pollution is discussed in the context of medical research and human health hazards. Research on the distribution of asbestos in aqueous suspensions, in potable water, in air, and in Lake Superior sediments is summarized, as well as asbestos areal distribution in Lake Superior and the Great Lakes and concommitant biological aspects. Specific research needs are delineated particularly as related to (1) counting and identification methods, (2) sampling programs, (3) public health hazards and hazards to aquatic organisms resulting from asbestos ingestion and sedimentation, and (4) the necessity to quantify and characterize trans-boundary asbestos pollution. Appendices detail the taconite mining and beneficiation process, the water requirements and waste water disposal practices of the Reserve Mining Company at Silver Bay Minnesota: the chronology of the Reserve Mining case through the various state and federal agencies and the courts; the International Joint Commission's hearings, and the current monitoring programs. The final appendix reprints the U.S. Eighth Circuit Court of Appeals decision and the presiding judge's essential Findings of Fact and Conclusions of Law. (Auen-Wisconsin)
W77-00927

WATER POLLUTION INVESTIGATION: BLACK RIVER OF NEW YORK.
Hydroscience, Inc., Westwood, N. J.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 019, Price codes: A05 in paper copy, A01 in microfiche. Report EPA 905/9-74-009, December 1974. 107 p, 21 fig, 13 tab, 5 ref, 3 append. EPA 68-01-1573.

Descriptors: *Lake Ontario, *Rivers, *Water pollution, *New York, *Water pollution control, Model studies, Dissolved oxygen, Sewage effluents, Industrial wastes, Municipal wastes, Biochemical oxygen demand, Low flow, Water quality standards, Reaeration, Waterfalls, Dams, River flow, Effluents, Biota, Projections.
Identifiers: *Black River(NY), Moase River(NY), Beaver River(NY).

A dissolved oxygen model was used to project the effect of proposed wastewater discharges on dissolved oxygen levels of the Black River, New York, which terminates in Lake Ontario. These discharges represent the best practical control technology presently available for industries and conventional secondary treatment for municipalities. New York dissolved oxygen standards will be met for design low flow conditions. Dissolved oxygen levels between Lyons Falls and Carthage were below the standard. Dissolved oxygen measurements upstream showed a background dissolved oxygen deficit not associated with direct waste water discharges. Of the ultimate biochemical oxygen demand discharged to the Black River and its tributaries, 85% was from industrial sources and 15% from municipalities. The Black River is reoxygenated by flows over dams and natural falls. Dissolved oxygen levels should be determined to define the magnitude and spatial distribution of the background deficit and its relation to agricultural runoff or seasonal variations. The degree of aeration and factors such as dam height, river flow, and temperature should be correlated. Because of a discrepancy between measured and computed river BOD concentrations it is recommended that the BOD oxidation mechanism in the Black River be further investigated. (Buchanan-Davidson--Wisconsin)
W77-00929

AN APPROACH TO A RELATIVE TROPHIC INDEX FOR CLASSIFYING LAKES AND RESERVOIRS. (A PRELIMINARY ANALYSIS OF NATIONAL EUTROPHICATION SURVEY DATA COLLECTED DURING THE 1972 SAMPLING PERIOD).
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W77-00930

NITROGEN AND PHOSPHORUS IN WASTEWATER EFFLUENTS. (A PRELIMINARY ANALYSIS OF NATIONAL EUTROPHICATION SURVEY DATA COLLECTED DURING 1972-73 SAMPLING PERIOD).
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W77-00931

ERAMS SURFACE AND DRINKING WATER COMPONENTS, JANUARY--MARCH 1974.
Office of Radiation Programs, Las Vegas, Nev.
For primary bibliographic entry see Field 5A.
W77-00954

RADIOACTIVITY IN KANSAS SURFACE WATERS, JANUARY--DECEMBER 1972.
Kansas State Board of Health, Topeka. Radiation Control Section.
For primary bibliographic entry see Field 5A.
W77-00955

NONPOINT POLLUTION: AN EPA VIEW OF AREAWIDE WATER QUALITY MANAGEMENT,
Environmental Protection Agency, Washington, D. C. Water Planning Div.
For primary bibliographic entry see Field 5G.
W77-00959

DETOXIFYING INDUSTRIAL WASTEWATERS.
For primary bibliographic entry see Field 5D.
W77-00965

PELAGIC TAR,
J. Butler.
Scientific American, Vol 232, No 6, p 90-97, June 1975. 8 p, 2 illus, 2 photo, 5 chart.

Descriptors: *Oil wastes, *Ships, *Oceans, *Water pollution sources, *Ocean circulation, Surface waters, Tides, Oil pollution, Oil spills, Oily water, Fuels, Bacteria, Benthic fauna, Research priorities, Data collections, International commissions, Water quality control.
Identifiers: *Pelagic tar.

The term 'pelagic tar' describes tarry residues of petroleum that are found on the surface of the ocean. In recent years there has been great concern that pelagic tar deposits, which mainly come from the discharge of waste by tankers, are rapidly polluting the oceans. At the least they are breeding grounds for oxygen-eating bacteria. At worst, they may result in disruption of the ocean's ecosystem. This article examines the characteristics, disintegration rates, and effects on other organisms of pelagic tar. Due to a lack of data, no definite conclusions are reached. However, there is a chance that critical damage to subtle chemical communication signals between ocean organisms may have already begun. Thus, the dumping of petroleum wastes should be stopped immediately by whatever international sanctions are available. (Frank-Florida)
W77-00969

OF PCB PPMS FROM GE AND A SNAFU FROM EPA AND DEC,
For primary bibliographic entry see Field 5A.
W77-00978

SHIGELLA RESEARCH IN THE SEA AND IN AN ESTUARY: I. FREQUENCY OF BACTERIOPHAGES IN POLLUTED WATER, (IN FRENCH),
Institut Royal des Sciences Naturelles de Belgique, Brussels.
Z. Dartevelle, and L. Desmet.
Ann Microbiol (Paris) 126B(1), p 95-97, 1975.

Descriptors: *Shigella, E coli, Estuaries, Bacteria, *Bacteriophage, Bays, Europe, Sampling, Water pollution sources, *Path of pollutants.
Identifiers: Italy, Shigella-sonnei, Yugoslavia, *Bay of Trieste(Italy), *Adriatic Sea(Yugoslavia), *River Isonozo(Italy).

Water samples in the Bay of Trieste, Italy, were taken from the bay receiving the city waste waters, the river Isonzo and the Adriatic Sea along the Yugoslav coast. The bay waters were particularly polluted, 95% of samples containing bacteriophages specific for Escherichia. coli B., E. coli 125 and Shigella sonnei YCD. S. sonnei comprises 80% of the shigellas currently isolated in Europe. (See also W77-01021 and W77-01022)--Copyright 1976, Biological Abstracts, Inc.
W77-01020

SHIGELLA RESEARCH IN THE SEA AND IN AN ESTUARY: II. ATTEMPT TO INHIBIT THE ADSORPTION OF SHIGAPHAGES AND STUDIES OF SHIGELLA ON A SELECTIVE MEDIUM, (IN FRENCH),
Institut Royal des Sciences Naturelles de Belgique, Brussels.
Z. Dartevelle, and L. Desmet.
Ann Microbiol (Paris) 126B(1), p 99-100, 1975.

Descriptors: *Shigella, Estuaries, Europe, Adsorption, Bacteria, Inhibition, Path of pollutants, Water pollution sources.
Identifiers: *Shigaphages, *River Ysar estuary(Belgium).

Two different bacteriological methods were tried in an attempt to identify the presence of Shigella organisms in sea water and in the Nieuwpoort channel, estuary of the river Ysar in Belgium. By 1 method, involving glycerin addition to the water to attenuate shigaphages, no Shigella were demonstrated although they probably were present in sewer water. Using the other method, with XLD medium, no shigellas were found. The lack of success may be due to the dissemination of bacteria in a hostile environment and to the presence of a competitive, possibly inhibitory, flora. (See also W77-01020 and W77-01022)--Copyright 1976, Biological Abstracts, Inc.
W77-01021

SHIGELLA RESEARCH IN THE SEA AND IN AN ESTUARY: III. IN VITRO DETERMINATION OF THE SURVIVAL TIME OF SHIGELLA SONNEI YCD IN SEA WATER, (IN FRENCH),
Inst. R. Sci. Nat. Belg., Bruxelles, Belg. Institut Royal des Sciences Naturelles de Belgique, Brussels.
Z. Dartevelle, and L. Desmet.
Ann Microbiol (Paris) 126B(1), p 101-103, 1975.

Descriptors: *Shigella, Estuaries, Sampling, Path of pollutants, Mortality, Laboratory tests, Water pollution sources.
Identifiers: *Shigella-Sonnei.

S. sonnei YCD were incorporated in freshly collected sea water, stored at refrigerator temperatures for 2 h-15 days then recuperated by bacteriologic techniques. Concentrations of 1 Shigella organsm/ml survived 6-24 h; 100 organisms/ml survived 8-10 days and 10,000 shigellae/ml survived 4-8 days. Despite the negative results of previous attempts to isolate Shigella organisms from sea water and bay water, the recuperation of Shigella from a marine environment is possible. (See also W77-01020 and W77-01021)--Copyright 1976, Biological Abstracts, Inc.
W77-01022

SANITARY AND HYGIENIC EVALUATION OF THE QUALITY OF UNDERGROUND DRINKING WATER, (IN RUSSIAN),
Municipal Sanitary Epidemiology Station, Zhukovskii (USSR)
M. P. Vasil'Ev, and T. V. Laikhter.
Gig Sanit 3, p 110-111, 1975.

Descriptors: *Water quality, *Potable water, Public health, Bacteria, *Artesian wells, Water wells, Bioindicators, Confined water, Subsurface water.
Identifiers: Russian-Sfsr.

Ten - year observations of drinking water from artesian wells in the city of Zhukovskii (Russian SFSR, USSR) showed that the bacteriological indices (including coli titer) have remained stable at the level of the water quality standards. In the well water there have been changes in the mineral composition, hardness and content of Fe, sulfates, chlorides and ammonium N. The stability of the bacteriological indices indicates the absence of surface and deep subsurface water pollution sources. Changes of chemical composition in some artesian wells are due to geologic processes occurring in subsurface aquifers.--Copyright 1976, Biological Abstracts, Inc.
W77-01023

HYGIENIC INVESTIGATIONS OF A CASE OF RIVER POLLUTION BY CHEMICAL PLANT WASTEWATERS, (IN RUSSIAN),
B. S. Pankratov, A. I. Chelombit'Ko, I. M. Bekish, and O. F. Syshchenko.
Gig Sanit 3, p 109-110, 1975.

Descriptors: Public health, *Chemical wastes, Industrial wastes, Water pollution, *Iron, Sulfates, *Hydroxides, Hydrogen ion concentration.
Identifiers: *Ferric sulfate, *Ferrous hydroxide, *Ferric hydroxide.

Insufficiently neutralized wastewaters from a chemical plant slime storage pond caused river water pollution. Dissolved ferric sulfate in the wastewaters was converted to ferrous hydroxide upon entering the river, due to change in pH. With subsequent intense aeration the ferrous hydroxide was converted to ferric hydroxide, giving the river water a yellow-brown color.--Copyright 1976, Biological Abstracts, Inc.
W77-01027

A METHOD FOR DETERMINING THE DISPERSIVE CAPACITY OF PREPARATIONS USED FOR REMOVING OILS FROM WATER SURFACE, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
N. M. Antonova, O. S. Mochalova, I. A. Nemirovskaya, and M. P. Nesterova.
Okeanologiya 15(2), p 333-337, 1975.

Descriptors: *Emulsification, *Emulsifiers, *Dispersion, *Oil pollution, Oil wastes, Methodology, Water pollution, Separation techniques.

A method is proposed for the evaluation of the dispersive (emulsifying) action of chemical products used for removing pollutant oil from the water surface. The accelerated method of destroying the arising emulsions in centrifugal field enables determination of emulsifying and definition of the influence of infinite dilution by water upon stability of the resultant emulsions of oil in water. The method is simple, rapid and yields comparable data for different dispersion agents and oils.--Copyright 1976, Biological Abstracts, Inc.
W77-01028

DISTRIBUTION AND SIGNIFICANCE OF FECAL INDICATOR ORGANISMS IN THE UPPER CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-01061

5C. Effects Of Pollution

SUBSTANTIATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF NIOBIUM IN WATER BODIES, (IN RUSSIAN),
Institut Gigieny Truda i Profzabolovsk (USSR).
L. A. Sazhine, and L. N. El'Nichnykh.
Gig Sanit 6, p 8-10, 1975.

Descriptors: Potable water, *Water quality standards, Metals, Enzymes, Water pollution effects, Public health, Toxicity, Lethal limit.
Identifiers: *Niobium, Maximum permissible concentration(Pollutants).

The threshold concentration of niobium as related to its effect on the general sanitary regimen of the water body and its use for drinking water use at a level of 0.1 mg/l (judging by biological 02 demand and development of saprophytic microorganisms). The threshold dose of niobium that caused disturbance of certain enzymatic processes in albino rats amounted to 0.005 mg/kg and the ineffective dose was 0.005 mg/kg. The maximum per-

missible concentration of niobium in water bodies should be set at a level of a level of 0.01 mg/l (according to the toxicological index of noxiousness).--Copyright 1976, Biological Abstracts, Inc.
W77-00529

AN INVESTIGATION INTO THE EFFECT AND CAUSE OF EUTROPHICATION IN GEORGETOWN LAKE, MONTANA,
Montana State Univ., Bozeman. Water Resources Research Center.
J. Knight, P. Garrison, and J. Wright.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 271, Price codes: A05 in paper copy A01 in microfiche. Research Report No. 77, (1976). 97 p, 26 fig, 12 tab, 57 ref. OWRT A-067-MONT(1).

Descriptors: *Eutrophication, *Water quality, Biological studies, Phytoplankton, Macrophytes, *Montana, Lakes, Water pollution effects, Cycling nutrients, Land use, Planning.
Identifiers: Georgetown Lake(Mont), Nutrient cycle, Land-use planning.

Georgetown Lake, located 15 miles west of Anaconda Mining Company, is the most heavily-used lake in Montana for its size. Because of the concern for the status of the lake and the potential for development of the watershed, the county commissioners and conservation districts from Deer Lodge and Granite Counties agreed that a study is needed to be conducted for an overall land-use plan for the Georgetown Lake watershed. Results include: The phytoplankton appeared to adapt to the low light levels under the ice cover. Plankton respiration rates were greater than the plankton gross photo-synthetic rates which indicates that there is rapid decomposition of dead phytoplankton and additional autochthonous inputs, i.e. macrophytes. Annual average daily gross photo-synthesis was 0.5 g.C.m-2.day. Plankton production during the winter was light limited. Phosphorus was apparently more limiting than N during the summer even though both nutrients were reduced to very low levels. Oxygen depletion under the ice was due to both sediment and plankton respiration rates. Additional oxygen input under the ice was required to compensate for the respiration rates. Macrophytic production and to a limited degree, ice-melt are responsible for the oxygen input during ice cover. The lake was not in a steady state since annual photosynthetic rates were greater than annual respiration rates. This indicates organic matter is accumulating in the sediments. Macrophytic production is of major importance in regulating the lake metabolism.
W77-00536

THE DELINEATION AND GROWTH OF A SLUDGE FIELD,
Institute of Oceanographic and Fisheries Research, Athens (Greece).
G. B. Griggs, and T. S. Hopkins.
Water Research, Vol 10, No 6, p 501-506, 1976. 7 fig, 10 ref.

Descriptors: *Water pollution effects, *Domestic wastes, *Sewage disposal, *Gulfs, *Sediments, Color, Odor, Organic compounds, Carbon, Hydrogen sulfide, Methane, Sea water, Oxygenation, Circulation, Aquatic life, Toxicity, Acoustics, Analytical techniques, Municipal wastes.
Identifiers: Saronikos Gulf, Athens, Greece.

The effect of discharging untreated domestic sewage from the city of Athens, Greece, on an area of restricted circulation in the upper Saronikos Gulf was investigated by delineating the color, odor, organic carbon, and acoustic reflection properties of bottom sediments. The discharge of untreated sewage via outfall has led to the deposition and growth of a large sludge field, with approximately 9 sq km of the sea floor being covered by black anoxic muds which give off hydrogen sulfide and are essentially devoid of benthic life. The organic carbon content of the muds is over 6% in some areas near the outfall in comparison with normal regional values of less than 0.5%. Seismic reflection characteristics which are believed to coincide with the production of methane gas distinguish a core area around the outfall. The circulation and oxygenation in the upper Saronikos Gulf are not adequate to disperse the waste water from the Athens area, with the result being that the benthic environment is rapidly being destroyed. (Kreager-FIRL)
W77-00603

THE EFFECT OF DIGESTED SLUDGE ON SOIL BIOLOGICAL ACTIVITY,
Wyzsza Szkola Rolnicza, Wroclaw (Poland).
For primary bibliographic entry see Field 5D.
W77-00612

EFFECTS OF SLAG ON AQUATIC LIFE,
Kinki Univ., Osaka (Japan). Dept. of Fisheries.
Y. Iitaka, R. Tsunda, T. Morinaga, and H. Kumai.
Mer (Tokyo). 11(4), p 205-210, 1973.

Descriptors: Water pollution effects, Aquatic life fish, *Zooplankton, *Growth rates, Rotifers, *Fish eggs.
Identifiers: *Slag.

The adhesion of aquatic life to iron slag dropped in the sea was observed. Fish were bred in containers either with or without slags. The growth rate of zooplankton, rotifer and the survival rate of fish eggs and larvae were studied. There were minor effects on the aquatic life. The aquatic organisms adhered to or gathered around slags immediately after they were dropped in the sea. The growth rate of fish in containers containing slags was better than that in containers without slag.--Copyright 1975, Biological Abstracts, Inc.
W77-00625

HEAVY METALS IN SOME NEW ZEALAND COMMERCIAL SEA FISHES,
Massey Univ., Palmerston North (New Zealand). Dept. of Chemistry, Biochemistry and Biophysics.
R. R. Brooks, and D. Rumsey.
N Z J Mar Freshwater Res. 8(1), p 155-166, 1974.

Descriptors: Heavy metals, Cadmium, Iron, Lead, Manganese, Nickel, Marine fish, Commercial fish, Copper, Chromium, Trace elements, Zinc, Toxicity.
Identifiers: Arripis-Trutta, Caranx-Lutescens, Cheilodactylus-Macropterus, Chrysophrys-Auratus, King-fish, Latridopsis-Ciliaris, *New Zealand, Polyprion-Oxygeneios, Seriola-Grandis, Snapper, Trigla-Kumu.

To establish a base line against which future pollution may be measured, 8 common commercial species of New Zealand sea fish were analyzed for Cd, Cr, Cu, Fe, Pb, Mn, Ni and Zn. One sample of edible muscle tissue was analyzed for each of 70 samples of each species. The internal organs of up to 5 specimens of each species were also analyzed. The fish studied were: kahawai, Arripis trutta, trevally, Caranx lutescens, tarakihi, Cheilodactylis macropterus, snapper, Chrysophrys auratus, moki, Latridopsis ciliaris, hapuku, Polyprion oxygeneios, kingfish, Seriola grandis and gurnard, Trigla kumu. Although none of the edible parts of the fish appeared to have trace element levels likely to be a public health problem (Cd 0.002-0.02 ppm, Cr 0.01-0.04 ppm, Cu 0.04-0.95 ppm, Fe 0.9-13.5 ppm, Pb 0.14-0.95 ppm, Mn 0.04-2.00 ppm, Ni 0.01-0.08 ppm, Zn 2.0-36.0 ppm), some of the organs (particularly the liver) had relatively high concentrations of elements such as Cd (up to 54 ppm). Only if some industry were to seek to exploit internal organs of fish for human consumption would such levels become important. There was some evidence for a relationship between trace element concentrations and fish size for Cu in king-fish and snapper, Fe in hapuku, Mn in gurnard, and for Zn in kingfish and tarakihi. Some element pairs such as Cu and Zn, Fe and Mn, appeared to have concentrations which were mutually related. It was assumed that the elemental concentrations reported represent natural levels and are not the result of significant man-made pollution because there are no major industries or large urban centers adjacent to the fishing grounds.--Copyright 1975, Biological Abstracts, Inc.
W77-00660

TOXICITY OF PARAQUAT TO PARACALLIOPE FLUVIATILIS (AMPHIPODA),
Canterbury Univ., Christchurch (New Zealand). Dept. of Zoology.
D. M. Hunt.
Mauri Ora. 2, p 67-72, 1974.

Descriptors: *Toxicity, Mortatity, *Amphipoda, *Paraquat, Herbicides, Water pollution effects, Aquatic weed control.
Identifiers: *Paracalliope-Fluviatilis.

Toxicity of the bipyridilium herbicide paraquat (used to control aquatic weeds) to the amphipod P. flubiatilis was investigated in the laboratory. Amphipods died in concentrations as low as 0.05 ppm. Mortality was greater among smaller amphipods. A delayed toxic effect was exhibited, with 70% of the amphipods accumulating a lethal dose after 10 h in 0.1 ppm paraquat. Paraquat adsorbed to sediment was still available for uptake by amphipods, although mortality rates were lower than those in paraquat solution.--Copyright 1975, Biological Abstracts, Inc.
W77-00666

SEDIMENT CHARACTERISTICS AND THE TROPHIC STATUS OF FOUR OREGON LAKES,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5B.
W77-00673

INTERRELATIONSHIPS BETWEEN CERTAIN MICROORGANISMS AND SOME ASPECTS OF SEDIMENT-WATER NUTRIENT EXCHANGE IN TWO BAYOU ESTUARIES, PHASES I AND II,
University of West Florida, Pensacola. Dept. of Biology.
G. A. Moshiri, W. G. Crumpton, D. P. Brown, P. R. Barrington, and N. G. Aumen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 538, Price codes: A03 in paper copy, A01 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 37, July 12, 1976. 45 p, 9 fig, 43 ref, append. OWRT B-024-FLA(2) and B-027-FLA(1). 14-31-0001-5065 and 14-31-0001-6068.

Descriptors: Bayous, Eutrophication, *Phosphates, Nutrients, Oxygen, *Bacteria, Dissolved solids, Glucose, *Dissolved oxygen, Estuaries, Absorption, Productivity, Kinetics, *Sediments, Microorganisms, *Oxidation-reduction potential.
Identifiers: *Oxygen depletion, *Glucose, Heterotrophic productivity, *Nutrient exchange.

Over a two-year period, certain aspects of nutrient exchange and regeneration were studied as related to major physical, chemical, and microbial parameters in two bayou estuaries. Sediment to water phosphate (PO3-4) exchange was affected by dissolved oxygen concentrations in both systems, but Eh effects of oxygen depletion on PO3-4 exchange kinetics differ in the two bayous. Sediment Eh profiles follow a temporal pattern perhaps related to the bacterial activity. Glucose

concentrations and uptake were monitored as related to possible sources and utilizers respectively. (Morgan-Florida)
W77-00674

AN AQUEOUS ENVIRONMENTAL SIMULATION MODEL FOR MID-SOUTH LAKES AND RESERVOIRS,
Arkansas Univ., Fayetteville. Coll. of Engineering.
L. J. Thibodeaux.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 539, Price codes: A05 in paper copy, A01 in microfiche. Arkansas Water Resources Research Center, Fayetteville, Publication No. 41, Engineering Experiment Station, Research Report No. 27, June 30, 1976. 82 p, 26 fig, 6 tab, 31 ref, append. OWRT A-026-ARK(3). 14-34-0001-6058.

Descriptors: *Arkansas, Water pollution effects, *Mathematical models, Lakes, Aqueous environment, *Simulation analysis, *Eutrophication, Forecasting, Reservoirs, *Model studies, Computer programs, Fish, Stratification, Aerobic bacteria, Phytoplankton, Zooplankton.
Identifiers: *Beaver Reservoir(Ark).

Quantitative relationships and associated computer program have been developed to simulate some of the major physical, chemical and biological processes occurring within the aqueous phase of lakes and reservoirs. The model was developed, in part, to study the eutrophic development of these water bodies. Emphasis is upon lakes in the Mid-South U.S.A. The physical model reflects the general environment in this region and includes a single stratified period. The chemical subsystem includes nitrogen, phosphorus, oxygen and carbon. The biological subsystem includes phytoplankton, zooplankton, omnivorous fish, carnivorous fish and aerobic bacteria. The model differential equations are solved numerically with the IBM Continuous System Modeling Program (CSMP). The output results (graphical or numerical) of critical eutrophic parameters can be obtained as a function of time (Julian Day), depth and distance down-lake. The model has been adjusted to field data from Beaver Reservoir in Northwest Arkansas. A comparison of the adjusted simulation and the field data is presented along with examples of use of the model for predictive purposes. An appendix contains the program listing, documentation and case studies. (See also W76-11692)
W77-00675

OYSTER SETTING AND EARLY SPAT SURVIVAL AT CRITICAL SALINITY LEVELS ON NATURAL SEED OYSTER BEDS OF DELAWARE BAY,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Zoology.
For primary bibliographic entry see Field 2L.
W77-00676

THE EFFECT OF SEWAGE-TREATMENT-PLANT EFFLUENT ON DIATOM COMMUNITIES IN THE NORTH BRANCH OF THE PORTAGE RIVER, WOOD COUNTRY, OHIO,
Bowling Green State Univ., Ohio. Dept. of Biology.
R. L. Lowe, and J. M. McCullough.
Ohio J Sci. 74(3), p 154-161, 1974.

Descriptors: Water pollution effects, *Diatoms, *Ohio, Rivers, Effluents, *Phosphorus, *Sewage effluents, Biological communities, *Nitrogen.
Identifiers: Achnanthes-affinis-var-affinis, Diatoma-hiemale-var-hiemale, Fragilaria-construens-var-binodis, Gompho-nema vulum, Gyrosigma-macrum-var-vacrum, Navicula-spp, Nitrogen, Nitzschia-spp, Pinnilaria, brebissonii-var-brebisson, River, Stauroneis-anceps-F-Linearis, *Potage River(Ohio).

The North Branch of Portage River was sampled using artificial substrates to determine the effect of sewage-treatment-plant effluent on the diatom communities. The effluent is a source of N & P for the river. Diatom-community composition is affected by the effluent; Gomphonema parvulum was especially abundant at stations with a high content of effluent. A total of 111 diatom taxa was observed; 24 of these taxa (Achnanthes affinis var. affinis, Diatoma hiemale var. hiemale, Fragilaria construens var. binodis, Gyrosigma macrum var. macrum, Navicula capitata var. luneburgensis, N. heufleri var. leptocephala, N. heufleri var. heufleri, N. muralis var. muralis, N. mutica var. mutica, N. mutica var. undulata, N. peregrina var. peregrina, N. placentula var. placentula, N. rhynococephala var. rhynococephala, N. viridula var. avenacea, Nitzschia acuminata var. acuminata, N. accomodata var. accomodata, N. baccata var. baccata, N. communis var. communis, N. denticula var. denticula, N. frustulum var subsalina, N. palea var. tropica, Pinnularia brebissonii var. brebissonii, Stauroneis anceps f. linearis were previously unreported from Ohio (USA).--Copyright 1975, Biological Abstracts, Inc.
W77-00681

PLANKTONIC CRUSTACEA OF THE RESERVOIR OF CUBILLAS NEAR GRANADA, (IN SPANISH),
Granada Univ. (Spain). Lab. of Ecology; and Granada Univ. (Spain). Dept. of Zoology.
For primary bibliographic entry see Field 2H.
W77-00683

INFLUENCE OF WATER TREATED ARTIFICIALLY WITH HERBICIDES ON HONEY BEE COLONIES,
Agricultural Research Service, Tucson, Ariz.
H. L. Morton, J. O. Moffett, and R. D. Martin.
Environ Entomol. 3(5), p 808-812, 1974.

Descriptors: *Herbicides, *Paraquat, Water pollution effects, Insects.
Identifiers: Apis-Mellifera, *Honey bee colonies.

Apis mellifera L. colonies were placed in isolated desert apiaries where their only source of water contained paraquat (concentration of 1000 parts per million active ingredient by weight (ppmw)). Large numbers of bees exposed to paraquat died immediately, and all were dead before the end of the 5th wk. When colonies were similarly exposed to like amounts of 2,4,5-T, larger numbers of bees drowned in the water because of the lower surface tension of the water, and production of brood was reduced below that of check colonies during the period the treated water was used and for 3 mo. thereafter; however, in the subsequent 9 mo., production returned to normal. Concentrations of 2,4,5-T in honey bees from colonies using water containing 2,4,5-T were as high as 148 ppmw, but this level dropped to about 5 ppmw as soon as the bees began using untreated water. Likewise, honey from colonies using water containing 2,4,5-T contained concentrations of 2,4,5-T as high as 50 ppmw; however, the concentration dropped to about 5.0 ppmw within 1 wk after the bees began using untreated water. The last day when any 2,4,5-T was detected in honey bees and honey from treated colonies was 480 days after the experiment began. Wax from colonies using the treated water contained detectable amounts of 2,4,5-T 650 days after the study was initiated.--Copyright 1975, Biological Abstracts, Inc.
W77-00689

INFANT MORTALITY AND WATER HARDNESS IN THE UNITED STATES,
National Inst. of Child Health and Human Development, Bethesda, Md. Epidemiology. Branch.
For primary bibliographic entry see Field 5G.
W77-00698

THE SEDIMENTS OF LAKE GEORGE (UGANDA). I: REDOX POTENTIALS, OXYGEN CONSUMPTION AND CARBON DIOXIDE OUTPUT,
Malaya Univ., Kuala Lumpur (Malaysia). School of Biological Sciences.
A. B. Viner.
Archiv fur Hydrobiologie, Vol. 76, No. 2, p. 181-197, 1975. 8 fig., 13 ref.

Descriptors: *Bottom sediments, *Oxidation-reduction potential, *Oxygen demand, *Carbon dioxide, *Cycling nutriets, Dynamics, Tropical regions, Eutrophication, Metabolism, Dissolved solids, Phosphates, Nitrogen, Oxygenation, Organic matter, Mud, Microorganisms, Africa.
Identifiers: *Lake George(Uganda).

To understand nutrient dynamics in tropical lakes, bottom sediments of equatorial, eutrophic Lake George (Uganda) were studied. The gross metabolic activity of sediments was studied to indicate the amount of mineralization possible. Low dissolved nutrient concentrations and high primary biomass producers did not permit nutrient utilization rates of change to be measured. Phosphate and inorganic combined nitrogen critically influenced primary production measurements. Turbulence through the shallow water column disturbed richly organic sediments. Gross metabolic activity was measured in terms of oxygen consumption, carbon dioxide liberation, and oxidation-reduction potential changes. Metabolic rates in vertical mud profile samples were strongly dependent on oxygen supply, which was largely controlled by turbulent mixing of water into mud and rapid oxygen consumption by large amounts of organic matter in the sediments. Turbulent mixing probably contributed to distribution of bacteria to about 18 cm of mud. This volume of mud could potentially supply nutrients to the water column, but the organic content permitted such rapid oxygen utilization that aerobic bacterial metabolism stopped quickly. Succession of various anaerobic microorganisms was blocked. Reduced aerobic activity preserved organic material in an undecomposed state. The significance of nutrient recycling from sediments was limited compared to primary producer potential demands. (Buchanan-Davidson—Wisconsin)
W77-00712

THE ROLE OF SEDIMENT AS A MODIFYING FACTOR IN PESTICIDE-ALGAE INTERACTIONS,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Botany.
M. A. Gillott, G. L. Floyd, and D. V. Ward.
Environmental Entomology, Vol. 4, No. 4, p. 621-624, 1975. 1 tab., 32 ref.

Descriptors: *Sediments, *Pesticides, *Algae, Inhibition, Insecticides, DDT, Photosynthesis, Euglena, Adsorption, *Toxicity, Translocation, Water pollution effects, Pesticide residues.
Identifiers: Carbaryl, Abate.

To determine the influence of pesticide-sediment associations on pesticide-algae interactions, inhibitory effects of three pesticides (DDT, Abate, and carbaryl) on algal photosynthesis were studied in one compartment (axenic Euglena gracilis cultures) and two compartment (alga plus sediment) systems. Carbon-14 incorporation was used to indicate photosynthetic activity. Twenty-four hour exposures to either DDT or carbaryl caused significant inhibition of photosynthesis in E. gracilis at concentrations of 10 ppb or higher. Abate was only marginally inhibitory at concentrations up to 100 ppb. Sediment dampened the pesticide effect. Differences between toxicities in 1 and 2 compartment systems were statistically significant for all three insecticides. Addition of sediment caused only slight increases in photosynthesis relative to non-sediment samples at the lowest pesticide levels; but at greater concentrations the sediment effect was greater. The size of sediment, the or-

ganic matter content, or presence of detergents or other surfactants could alter the sediment effects. The significant reduction of photosynthesis of E. gracilis by carbaryl or DDT in the presence of sediments, would suggest that in nature sediments would dampen insecticide toxicities, especially in shallow bodies of water with large surface to volume ratios. (Buchanan-Davidson--Wisconsin)
W77-00713

DETRITUS FORMATION FROM EELGRASS (ZOSTERA MARINA L.): THE RELATIVE EFFECTS OF FRAGMENTATION, LEACHING, AND DECAY,
Dalhousie Univ., Halifax (Nova Scotia).
P. G. Harrison, and K. H. Mann.
Limnology and Oceanography, Vol. 20, No. 6, p. 924-934, 1975. 7 fig., 8 tab., 29 ref.

Descriptors: *Marine plants, *Detritus, *Degradation(Decomposition), *Leaching, Leaves, Biodegradation, Laboratory tests, Particle size, Organic matter, Sea water, Nitrogen, Littoral, Carbon, Drying, Primary productivity, *Canada, *Decomposing organic matter.
Identifiers: *Eelgrass, St. Margaret's Bay(Nova Scotia).

Decomposition reduces leaf particulate detritus to subparticulate forms by fragmentation, autolysis, leaching, and microbial decay. Eelgrass detritus consists of nonliving leaf debris and associated, living microorganisms. In laboratory experiments, dead eelgrass leaves lost 35% of their original dry weight in 100 days at 20C. Whole leaves lost 0.5% of their organic content/day, while particles less than 1 mm lost 1%/day. Sterilization of leaves by dry heat or potassium cyanide indicated that leaching accounted for 82% of the organic matter lost from predried material and 65% of that lost from undried material. Bacteria increased detrital nitrogen but degraded leaf material slowly. When protozoa grazed on bacteria, they kept the bacteria in an active metabolic state and increased decay rates. Incubated detritus carbon:nitrogen ratios decreased from 20:1 to 11:1, indicating an increase in potential food value. This slow decomposition rate could permit the eelgrass detritus system to continue functioning during short-term fluctuations in eelgrass primary production by ensuring the presence of slowly decomposing material. A model illustrates the eelgrass detritus system. Formation of detritus from eelgrass leaves is important in many coastal marine environments. (Buchanan-Davidson--Wisconsin)
W77-00715

SOME THEORETICAL CONSIDERATIONS OF THERMAL DISCHARGE IN SHALLOW LAKES,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
H. L. Golterman.
H20 (The Netherlands), No. 1, p 19-26, January 1976. 16 fig, 19 ref.

Descriptors: *Water pollution effects, *Thermal pollution, *Shallow water, *Biological communities, *Lakes, Photosynthesis, Respiration, Inhibition, Succession, Ecosystems, *Water temperature, Cycling nutrients, Competition, Zooplankton, Food chains, Theoretical analysis, Growth rates, Biomass, Dominant organisms, Eutrophication, Europe.
Identifiers: *Netherlands.

Effects of artificially elevated water temperature by thermal discharge on zooplankton and phytoplankton are described. Energy in aquatic ecosystems enters food chains via phytoplankton and is then dispersed via zooplankton or bacteria. Temperature increases affect net phytoplankton growth positively or negatively, depending on species. At high temperatures, mineralization occurs more rapidly and causes faster growth rates, but not necessarily larger biomass. Temperature strongly influences the selection of dominant species. Both temperature and eutrophication act synergistically to stimulate production of blue-green algal blooms. High temperatures increase the number of zooplankton generations per year without increasing food production. The deleterious effect on overwintering fauna may leave openings in the ecosystem and disturb the predator-prey processes. Tolerance of ecosystems to temperature changes is smaller in winter than in summer. (Buchanan-Davidson--Wisconsin).
W77-00716

SEASONAL FLUCTUATIONS OF DIELDRIN RESIDUES IN THE TISSUES OF THE MARSH CLAM, RANGIA CUNEATA, FROM A TEXAS ESTUARY,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 5B.
W77-00717

A SENSITIVE ALGAL ASSAY: AN IMPROVED METHOD FOR ANALYSIS OF FRESHWATERS,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5A.
W77-00719

PHYTOPLANKTON SUCCESSION IN A MATURING NORTHWEST TEXAS RESERVOIR (LAKE MEREDITH),
West Texas State Univ., Canyon. Dept. of Biology.
W. Z. Cooper, and C. E. Newton.
Texas Journal of Science, Vol. 26, No. 3-4, p. 449-458, 1975. 5 fig, 3 tab, 19 ref.

Descriptors: *Biological communities, *Succession, *Phytoplankton, *Reservoirs, *Texas, Dissolved oxygen, Temperature, Cycles, Chlorophyta, Nitrogen, Diatoms, Phosphorus, Cyanophyta, Euglenophyta, Pyrrophyta.
Identifiers: *Lake Meredith(Texas), Ankistrodesmus falcatus, *Cyclotella meneghiniana, Coelastrum microporum, Oocystic borgei.

Lake Meredith, a young, relatively deep impoundment in Texas, was studied from November 1966 to April 1968. Nitrate peaks were observed periodically. Phosphate levels were high at first, but then did not exceed 0.2 mg/1. A temporal succession of phytoplankton was observed which apparently was due to an organism-produced phosphorus depletion. After depletion, phosphorus remained at an almost constant concentration which was more limiting for the green alga, Ankistrodesmus falcatus, than was nitrogen for the diatom, Cyclotella meneghiniana. Cyclotella blooms are controlled by the nitrogen level, thus Cyclotella began to decrease earlier and depleted nitrogen and phosphorus supplies before there was enough phosphorus for Ankistrodesmus to compete. With Ankistrodesmus no longer a dominant part of the community, two colonial algae, Coelastrum microporum and Oocystis borgei filled the niche in community structure. During this period the structure of the blooms began to change: green algal blooms before and after the Cyclotella blooms became smaller and blended with diatom to form a symmetrically cumulative bloom. The identified species are listed, grouped in the order of abundance. (Buchanan-Davidson--Wisconsin)
W77-00720

EFFECTS OF ENVIRONMENTAL FACTORS ON PHOTOSYNTHESIS PATTERNS IN PHAEODACTYLUM TRICORNUTUM (BACILLARIPHYCEAE). II. EFFECT OF OXYGEN,
University Coll., London (England). Dept. of Botany and Microbiology.
J. Beardall, and I. Morris.
Journal of Psychology Vol. 11, No. 4, p. 430-434, 1975. 5 fig., 3 tab., 12 ref.

Descriptors: *Environmental effects, *Photosynthesis, *Diatoms, *Oxygen, Light intensity, Marine algae, Inhibition, Bicarbonates, Hydrogen ion concentration, Respiration, Plant physiology.
Identifiers: *Phaeodactylum tricornutum.

The rate of light-saturated photosynthesis of the marine diatom Phaeodactylum tricornutum was inhibited by oxygen only if the oxygen concentrations approached 100%. At atmospheric oxygen concentrations (21%), there was little effect on photosynthesis. In this respect, Phaeodactylum more closely resembled C-4 plants which have low rates of photorespiration. The test results showed increased oxygen inhibition at reduced bicarbonate concentrations. The Phaeodactylum biochemical mechanism of photorespiration appeared similar to that of other photosynthetic systems. The ribulose-1,5-diphosphate carboxylase activity in cell-free extracts was also inhibited by oxygen. Oxygen inhibition and ribulose-1,5-diphosphate-dependent oxygen uptake were optimal at pH 9.2. Ribulose-1,5-diphosphate carboxylase to oxygenase ratios decreased with increasing pH and were higher in cells grown under lower light intensities. Carboxylase levels were less affected by light intensity for growth than oxygenase levels. The short-term incorporation of sodium bicarbonate-carbon-14 by cells grown at high light intensities showed increased labeling of glycolate and glycine plus serine under oxygen compared to nitrogen. Radioactivity decreased concomitantly in phosphoglyceric acid and sugar phosphates in the presence of oxygen. Oxygen effects on the short-term pattern of photosynthesis were less marked when the alga had been previously grown at low light intensities. (Buchanan-Davidson--Wisconsin)
W77-00721

WATER POLLUTION INVESTIGATION: MAUMEE RIVER AND TOLEDO AREA,
Enviro Central, Inc., Rockville, Md.
J. Horowitz, J. R. Adams, and L. A. Bazel.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-242 287, $7.50 in paper copy, $3.00 in microfiche. Report EPA-905/9-74-018, January 1975. 185 p. 24 fig., 19 tab., 2 append. EPA 68-01-1567.

Descriptors: *Water pollution, *Ohio, *Rivers, *Estuaries, *Water pollution control, Dissolved oxygen, Hydrologic aspects, Runoff, Treatment facilities, Coliforms, Lake Erie, Water levels, Agricultural runoff, Sewage treatment, Sediment load, Monitoring, Bottom sediments, Effluents, Sampling, Water quality standards.
Identifiers: *Maumee River(Ohio), *Toledo(Ohio).

The combination of hydraulic factors, the historical changes in land use, the runoff sediment load, agricultural runoff, malfunctioning sewers and sewage treatment plant operations, thermal pollution, and Lake Erie water level fluctuations contribute to the gross pollution of the Maumee River estuary in the vicinity of Toledo, Ohio. Among the recommendations suggested to improve the estuary's water quality are that research be instituted of the hydraulics and sediment dynamics of the estuary, as a basis of wasteload quality allocations. Sampling methods must consider the major features of estuarine behavior--stratification, flow reversals, and irregular times of passage. Sample preservation and analysis should be drastically improved and the monitoring programs coordinated. Water quality standards for the lower Maumee and its tributaries must be clarified and more precisely defined; especially the 'ammonia' standard should be restated to delineate ammonium and ammonia. Sewers and sewer regulators should be repaired immediately to eliminate the floating filth and bubbling sludge beds in the river. The thermal outfall should be carefully controlled when the river's DO is low; and that the DO standard of 5 mg/l in the vicinity of the outfall be reconsidered. The water quality standards should be revised to reflect the

diversity of the various watercourses in the area and of their varying potential for improvement. (Auen-Wisconsin)
W77-00723

WATER POLLUTION INVESTIGATION: ERIE, PENNSYLVANIA AREA,
Betz Environmental Engineers, Inc., Plymouth Meeting, Pa.
F. X. Browne.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-246 628, $7.50 in paper copy, $3.00 in microfiche. Report EPA-905/9-74-014, March 1975. 206 p. 18 fig., 13 tab., 29 ref., 3 append. EPA 68-01-1578.

Descriptors: *Water pollution sources, *Water pollution control, *Pennsylvania, *Lake Erie, Thermal pollution, Tributaries, Industrial wastes, Sewage effluents, Treatment facilities, Water pollution effects, Sewerage, Water quality, Bottom sediments, Plankton, Oil pollution, Heavy metals, Storm drains, Monitoring, Physical properties, Bacteria, Chemical properties, Biological properties.
Identifiers: *Erie(Pa), *Presque Isle Bay(Pa), Garrison Run(Pa), Mill Creek(Pa), Penn Central RR Yards.

Water quality in Presque Isle Bay and Lake Erie near Erie, Pennsylvania, is relatively good, except for high levels of total and fecal coliform bacteria. A few localized areas of degraded water quality were identified. Hammermill Paper Company waste water discharges are pigmented. Heated condenser discharges from the Pennsylvania Electric Company have recirculated into the bay, causing annual dieoffs of gizzard shad. Cascade Creek, Mill Creek, and Garrison Run are polluted. Mill Creek contributes the highest pollution load, followed by Cascade Creek and Garrison Run, based on water quality determinations and flow estimates. Minimal yard operations are being performed by Penn Central, but some areas are impregnated with oil which is sometimes picked up by stormwater. Water quality at Beach 11 on Presque Isle Bay may be adversely affected by filling the area adjacent to Koppers Company with lake dredge materials. Monitoring of physical, chemical, and biological parameters, and flow of the three tributaries should be continued in order to define the magnitude, causes, and effects of water quality problems. Temporal and spatial trends should be identified. Illegal sanitary and industrial connections should be eliminated. The Hammermill Paper Company should reduce their wastewater discharges. Penn Central should initiate an oil spill prevention and clean-up program. (Buchanan-Davidson--Wisconsin)
W77-00724

THE INFLUENCE OF LAND USE ON STREAM NUTRIENT LEVELS,
Corvallis Environmental Research Lab., Oreg. Eutrophication Survey Branch.
J. M. Omernik.
Report EPA 600/3-76-014, January 1976. 114 p. 29 fig., 8 tab., 31 ref., 1 append.

Descriptors: *Watersheds(Basins), *Land use, *Runoff, *Nutrients, *Mathematical models, Urban runoff, Agricultural runoff, Forest watersheds, Phosphorus, Nitrogen, Streams, Streamflow, Flow rates, Eutrophication, Surveys, Forecasting, Hydrogen ion concentration, Equations, Regression analysis.
Identifiers: Non-point nutrient sources, National Eutrophication Survey.

Drainage area characteristics and stream nutrient runoff data for 473 non-point source-type drainage areas in eastern United States were analyzed based on the National Eutrophication Survey data. Higher nutrient concentrations were found in streams draining agricultural rather than forested watersheds. Nutrient concentrations were generally proportional to percent of agricultural land. Mean total phosphorus concentrations were nearly ten times greater and mean total nitrogen concentrations five times greater in streams draining agricultural rather than forested areas. Inorganic nitrogen increased from about 27% in streams draining forested areas to over 75% in streams draining agricultural watersheds. Orthophosphorus was always about 40% of total phosphorus contents. Differences in nutrient loads were not as pronounced as differences in nutrient concentrations in streams in different land use areas, mainly due to differences in areal streamflow, mean annual precipitation patterns, and mean slope of study areas. The most accurate method of predicting export values or stream loads was to use models for stream nutrient concentrations and multiply by flow. Regression analyses of the combined percentages of agricultural and urban land uses against both the total and inorganic forms of phosphorus and nitrogen were performed. Equations for these analyses, together with maps illustrating the equations' residuals, offer a limited predictive capability and some accountability for regional characteristics. (Buchanan-Davidson--Wisconsin)
W77-00725

PLANT PRODUCTION IN EXPERIMENTAL STREAMS, A COOPERATIVE RESEARCH PROJECT WITH WEYERHAEUSER COMPANY,
Oregon State Univ., Corvallis. Dept. of Botany and Plant Pathology.
D. E. Busch, and C. D. McIntire.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 606, Price codes: A02 in paper copy, A01 in microfiche. Completion Report WRRI-45, September 1976. 17 p, 6 fig, 7 ref. OWRT A-035-ORE(1).

Descriptors: *Plant growth, *Energy budget, *Nutrients, *Primary productivity, Herbivores, Algae, Industrial wastes, Ecosystems, Trophic level, Washington, Light, Biomass, Eutrophication, Nitrogen, Chlorophyll, Periphyton, Invertebrates, Standing crops, Algal control.
Identifiers: Bioenergetics, Carnivores.

The general objective is to determine the effects of nutrient enrichment and other environmental changes on rates of primary production and on the structure of algal communities in experimental streams. Nutrient enrichment-primarily nitrogen will simulate introductions related to forest management policies practiced by Weyerhaeuser Company, Longview, Washington, namely forest fertilization and nutrient introductions resulting from logging activities. The project was designed as a sequence of two experiments, designated the winter and summer experiments. The winter experiment involved reducing light intensity, while the summer experiment was concerned with nutrient (nitrate) enrichment at different light intensities. The recovery of the stream system after the catastrophic reduction of biomass in the riffles was characterized by a rapid accumulation of algae and invertebrates. Measures are presented of total biomass (ash free dry weight), algal standing crop (chlorophyll a concentration), and animal standing crop (dry weight estimated from observed body size). These patterns of accumulation do not indicate a steady, continual increase in living material with distinct differences between streams receiving different intensities of light. Total biomass exhibited an increase, decrease, and subsequent increase after the perturbation for both the shaded and unshaded streams. This pattern was also observed in the estimates of algal density in the riffles. However, the unshaded riffles showed a faster accumulation of algae than the shaded riffles during the first 70 days. Standing crop of invertebrates differed from this pattern. Invertebrate biomass increased and then gradually decreased in both streams during the experiment. The patterns of algal, invertebrate, and total biomass represented biological responses to an increase of resources. The removal of biomass increased a critical resource (space) for periphytic algae under constant physicochemial conditions. The subsequent accumulation of algae increased the food resource for the invertebrates. Grazing reduced algal density, and reduced algal density supported a lower invertebrate standing crop. Estimates of herbivore and carnivore biomass indicated herbivore response to algal increase followed by carnivore response to herbivore increase.
W77-00735

EVALUATING IMPACT OF FOREST SITE PREPARATION ON SOIL AND WATER QUALITY IN THE U.S. GULF COASTAL PLAIN,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
For primary bibliographic entry see Field 5B.
W77-00740

CHEMICAL CHARACTERISTICS AND ACUTE TOXICITY OF FOAM ON TWO AERATED LAGOONS,
International Pacific Salmon Fisheries Commission, Cultus Lake (British Columbia). Sweltzer Creek Salmon Research Lab.
J. A. Servizi, R. W. Gordon, I. H. Rogers, and H. W. Mahood.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 6, p 1284-1290, June, 1976. 3 fig, 1 tab, 21 ref.

Descriptors: *Pulp and paper industry, *Lagoons, *Foaming, *Chemical wastes, *Toxicity, Sockeye salmon, Fish, Biological treatment, Industrial wastes, Acids, Resins, Surfactants, Chemical properties, Physical properties, Waste water treatment.
Identifiers: Terpenes, Diterpenes, Resin acids.

Foam collected from two aerated lagoons treating kraft pulp effluents was highly toxic to juvenile sockeye salmon (Oncorhynchus nerka). Bioassays of the fish demonstrated that the toxicity of the foam was contained in the methanol-soluble fraction. Chemical fractionation of one foam revealed large amounts of toxic resin acids and neutral diterpenes. In the other foam, toxicity was related to a nonionic surfactant pitch dispersant and unidentified material. The foam containing toxic resin acids and neutral diterpenes was 1000 times more toxic to salmon than bleached kraft mill effluent. Neither foam was readily detoxified by biological treatment in the laboratory. The chemical and physical characteristics of each foam are tabulated in detail. (Kreager-FIRL)
W77-00752

EFFECT OF AN ARTIFICIALLY INCREASED SAND BEDLOAD ON STREAM MORPHOLOGY AND ITS IMPLICATIONS ON FISH HABITAT,
North Central Forest Experiment Station, Rhinelander, Wis. Inst. of Forest Genetics.
For primary bibliographic entry see Field 2J.
W77-00814

THE MACROPHYTE VEGETATION OF FIVE LAKES IN VEFSN, NORDLAND COUNTY, NORTH NORWAY, (IN NORWEGIAN),
L. Malme.
Blyttia 32(4), p 239-250, 1974.

Descriptors: *Vegetation, Lakes, *Oligotrophy, Humus, Mesotrophy.
Identifiers: Carex-Spp, Comarum-palustre, Equisetum-fluviatile, Galium-uliginosum, Juncus-filiformis, Lobelia, Myriophyllum-alterniflorum, Potamogeton-Spp, Ranunculus-reptans, Scirpus-palustris, Sparganium-angustifolium, Subularia-aquatica, Vefsn, *Macrophyte vegetation, *Nordland County(Norway).

From chemical parameters, the lakes are described as oligotrophic, moderately acid to neutral, poor in electrolytes and Ca and mesohumous to oligohumous. The lakes are strongly exposed to winds, and the bottom substratum in the shallow zones mainly consist of mineral materials. The lakes are classified as Lobelia lakes. The vegetation is poor in species and the biomass is low. Common taxa include Carex spp., Comarum palustre, Equisetum fluviatile, Galium uliginosum, Tuncus filiformis, Myriophyllym alterniflorum, Potamogeton spp., Ranuculus reptans, Scirpus palustris, Sparganium angustifolium and Subularia aquatica.--Copyright 1976, Biological Abstracts, Inc.
W77-00823

EFFECTS OF SEDIMENTATION ON COASTAL ZONE ORGANISMS,
New York Univ. Medical Center, N. Y. Lab. for Environmental Studies.
J. M. O'Connor, and J. A. Sherk.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 6-1 - 6-16, 1976. 45 ref.

Descriptors: *Sedimentation, *Biology, *Coasts, *Mineral industry, Water pollution, Effects, Biological communities, Marine biology, Fish, Benthic fauna, Zooplankton, Sediments, Dredging, Waste disposal, Turbidity, Estuaries, Suspended solids, Shores, Phytoplankton.
Identifiers: *Sedimentation effects, Coastal zone.

Some direct and indirect effects of sedimentation on coastal zone organisms were identified and discussed with respect to future increases in exploitation of coastal zone mineral resources (sand and gravel mining, oil and gas extraction), construction, dumping (sewage sludge, dredged material, demolition debris), and dredging. It was concluded that the potential biological effects of particulate organic and inorganic material which has been suspended, resuspended, and deposited in the coastal zone will depend at least upon (1) concentration, (2) composition (mineral types, particle sizes and shapes), (3) sorbed minerals, toxins, or other associated substances, and (4) tolerances of the organisms. Tolerance limits (sensitivities) of organisms to sedimentation can differ with respect to trophic level, life stage, feeding mechanisms, habitat preference (mud-water interface, shoal water, open water) and duration of exposure. At coastal zone sites selcted for sedimentation changes, an appropriate basis for preproject decision making could be provided by identification of the most sensitive biological components (important species and life stages) and an adequate knowledge of local conditions. (See also W77-00775) (Sims-ISWS)
W77-00838

CHEMICAL AND BIOLOGICAL MOBILIZATION OF HEAVY METALS FROM ESTUARINE SEDIMENTS,
Corps of Engineers, San Francisco, Calif. South Pacific Div.
For primary bibliographic entry see Field 5C.
W77-00839

CHEMICAL AND BIOLOGICAL MOBILIZATION OF HEAVY METALS FROM ESTUARINE SEDIMENTS,
Corps of Engineers, San Francisco, Calif. South Pacific Div.
T. H. Wakeman.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D. C., Sedimentation Committee, p 6-17 - 6-27, 1976. 11 ref.

Descriptors: *Sediments, *Heavy metals, Biology, *Estuaries, Dredging, Chemical reactions, *Biological communities, Suspended solids, Cadmium, Lead, Zinc, Copper, Chemistry, Water pollution, Waste disposal, Pollution.
Identifiers: *Biological reactions.

The recent emphasis on estuarine pollution has culminated in a series of Federally funded research programs to identify the mechanisms involved in the movement of heavy metals from the sediment reservoir into the biosphere. The U. S. Army Corps of Engineers, San Francisco District, as part of its Dredge Disposal Study, is conducting experiments both in the laboratory and in the field to evaluate the possible influence of dredging operations on mobilization of heavy metals, and their ultimate uptake and accumulation by estuarine biota. Investigations have shown that cadmium, lead, zinc, and copper can be emitted from resuspended San Francisco Bay sediments under oxygen rich conditions. Biological investigations have shown that dissolved heavy metals ions can be accumulated during low salinity periods and desorbed as the salinity increases. Field studies have shown that estuarine organisms will accumulate heavy metals during periods of high urban runoff. Heavy metals may be taken up and accumulated by organisms following dredging activities via chemical reactions in the water column causing increased ambient concentrations or by ingesting and breaking down organic matter containing metals. (See also W77-00775) (Sims-ISWS)
W77-00839

BIOLOGICAL EFFECTS OF HEAVY METALS ON JUVENILE BAY SCALLOPS, ARGOPECTEN IRRADIANS, IN SHORT-TERM EXPOSURES,
National Marine Fisheries Service, Milford, Conn. Middle Atlantic Coastal Fisheries Center.
D. A. Nelson, A. Calabrese, B. A. Nelson, J. R. MacInnes, and D. R. Wenzloff.
Bulletin of Environmental Contamination and Toxicology, Vol. 16, No. 3, 1976, p 275-282, 3 tab, 23 ref.

Descriptors: Environmental effects, *Heavy metals, *Mollusks, *Cadmium, *Silver, *Mercury, *Arsenic, *Mortality, *Respiration, Toxcity, Water pollution effects.
Identifiers: Argpecten irradians.

The purposes were to determine the acute effect of arsenic, cadmium, mercury, and silver on survival of juvenile bay scallops after 96 hours of exposure, to investigate tissue uptake of these metals, and to determine changes in oxygen consumption rates in scallops exposed to the estimated LC5 and LC25 values of silver and cadmium as determined from the acute toxicity studies. 95% mortality was seen with silver concentrations of 0.086 ppm, mercury at 0.150 ppm, cadmium at 2.33 ppm, and arsenic at 5.41 ppm. 50% mortality values were 0.033 ppm for silver, 0.089 ppm for mercury, 1.48 ppm for cadmium, and 3.49 ppm for arsenic. Results indicated that scallops exposed to the LC5 and LC25 levels of cadmium exhibited significantly higher oxygen consumption rates than the controls. Scallops exposed to silver at the LC25 level respired at a higher rate but those at the LC5 level respired at a slightly lower rate. Results indicated that scallops can rapidly accumulate high levels of metals in their body tissues. (Chilton-ORNL)
W77-00872

ACCUMULATION AND DISTRIBUTION OF SELENIUM IN MUSSEL AND SHRIMP TISSUES,
International Lab. of Marine Radioactivity Monte Carlo (Monaco). Oceanographic Museum.
S. W. Fowler, and G. Benayoun.
Bulletin of Environmental Contamination and Toxicology, Vol. 16, No. 3, 1976, p 339-346, 4 fig, 1 tab, 16 ref.

Descriptors: Environmental effects, *Selenium, *Mussels, *Shrimp, *Bioassay, Heavy metals, Toxicity, Water pollution effects, Absorption.
Identifiers: Tissue accumulation, Exoskeleton.

One group of mussels and shrimps was maintained in sea water containing 0.8 microCi/l high specific activity Se 75. Another group, maintained in flowing sea water, was fed ad libitum mussels that had previously accumulated Se 75 from sea water. The third group was analyzed to assess tissue distribution of stable selenium in animals considered to be at equilibrium with this element in their environment. The highest concentrations in shrimp tissues of selenium accumulated from water were found in the exoskeleton. Molts contained from 60 to 90% of the total Se 75 body burden. When uptake occurred via the food chain, the highest activity was found in the visceral tissues but the high level of Se 75 associated with the exoskeleton attests to the fact that ingested selenium is readily translocated from internal to external tissues. The relative order of stable selenium in shrimp tissues showed that viscera displayed the highest, eyes and exoskeleton intermediate, and muscle the lowest concentrations. In mussels, the mantle had the highest stable selenium concentration of any tissue analyzed and the lowest degree of uptake in the tracer study. (Chilton-ORNL)
W77-00873

UPTAKE AND RELEASE OF PHOSPHORUS BY PHYTOPLANKTON IN THE CHESAPEAKE BAY ESTUARY, USA,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
J. L. Taft, W. R. Taylor, and J. J. McCarthy.
Marine Biology, Vol. 33, 1975, p 21-32, 3 fig, 6 tab, 46 ref. AT(11-1)-3279.

Descriptors: *Metabolism, *Phytoplankton, Plant physiology, *Phosphorus, *Phosphates, Membranes, On-site investigations, *Absorption, *Chesapeake Bay.
Identifiers: *Excretion.

Uptake and release rates for inorganic phosphate, dissolved organic phosphate and polyphosphate by phytoplankton were estimated during 5 cruises covering a 9 month period of time. The time for phophorus turnover in all pools ranged from several minutes to 100 h. Each soluble pool appeared to contain fractions which were metabolically useful to phytoplankton. At low soluble reactive phosphorus concentrations, the uptake rate of trace P 32 orthophosphate was initially rapid, but declined after 15 to 60 min. incubation. The common shape of the P 32 orthophosphate uptake curves suggests that the initial rapid rate of uptake and subsequent reduced rate represent different phenomena. It was suggested that either the entire curve represents net uptake which slows with experiment duration as the level of available orthophosphate approaches the uptake limiting concentrations or that the initial uptake represents exchange across the cell membrane and only the subsequent reduced rate is net uptake. (Chilton-ORNL)
W77-00874

THE EFFECTS OF TEMPERATURE AND HYDROSTATIC PRESSURE ON ENZYMES OF AN ABYSSAL FISH, ANTIMORA ROSTRATA: LIVER NADP-LINKED ISOCITRATE DEHYDROGENASE,
Ottawa Univ. (Ontario). Dept. of Biology.
T. W. Moon, and K. B. Storey.
Compilations in Biochemistry and Physiology, Vol. 52B, p 51-57, 1975 7 fig, 2 tab, 24 ref.

Descriptors: Environmental effects, *Temperature, *Hydrostatic pressure, Fish, Benthos, *Enzymes, Water pollution effects.
Identifiers: Enzyme activity, *Antimora rostrata.

NADP-linked isocitrate dehydrogenase was isolated from the liver of the benthic fish Antimora rostrata. Investigation showed that, at high isocitrate concentrations, enzyme activities were moderately affected by pressure increases of up to 12000psi. The enzyme activities were very temperature sensitive below 12C. The enzyme activity was inhibited at high concentrations of the reduced pyridine nucleotides, NADH and NADPH. Physiological pressure and temperature conditions enhanced the activity of NADH and NADPH at low concentrations. Guanosinetriphosphate and alpha ketoglutarate also acted as modifiers of IDH activities. It was concluded that these modifiers were responsible for reducing the pressure and temperature sensitivities of this enzyme and that they implicate the importance of this enzyme in cellular metabolism. (Chilton-ORNL)
W77-00875

THERMAL STRESS FOR HEXADECANE DECOMPOSITION IN SEAWATER OF A NATURAL ENVIRONMENT,
Tokyo Univ. (Japan). Ocean Research Inst.
H. Seki.
La mer, Vol. 13, No. 2, p 53-57, May 1975 2 fig, 2 tab, 11 ref.

Descriptors: Environmental effects, *Temperature, Biochemistry, Biodegradation, *Thermal stress, Microorganisms, Sea water, *Chemical degradation, Asia.
Identifiers: *Hexadecane decomposition, Japan.

The thermal alteration of microbial activity was studied on hexadecane decomposition by microorganisms in salt water of a natural pool of Shimogamo Hot Spring. A significant linear relationship existed between the logarithm of the in situ potentiality of hexadecane decomposition and temperature. The regression line was determined statistically within the temperature range of 42.8 - 63.9C in the pool. The rate of hexadecane decomposition in salt water of the pool was approximately 10 microg hexadecane/l/hr. (Chilton-ORNL)
W77-00876

RELATIONSHIP OF VIBRIO PARAHAEMOLYTICUS IN OYSTERS, WATER, SEDIMENT, AND BACTERIOLOGICAL AND ENVIRONMENTAL INDICES,
Texas A and M Univ., College Station. Dept. of Animal Science.
C. A. Thompson, C. Vanderzant, and S. M. Ray.
Journal of Food Science, Vol. 41, 1976, p 117-122, 11 fig, 1 tab, 19 ref.

Descriptors: Environment, *Pathogenic bacteria, Aquatic life, Marine microorganisms, *Oysters, Sediments, Bacteria, Water pollution effects, *Bioindicators.
Identifiers: *Vibrio parahaemolyticus.

153 samples of oysters, water and sediment were tested and of these 61.4% resulted in positive tests for Vibrio parahaemolyticus. The pathogen was present in 59.3% of the oyster samples, 49% of the water samples, and 76% of the sediment samples. No significant correlation was found between V. parahaemolyticus and the various bacteriological and environmental parameters. (Chilton-ORNL)
W77-00877

THE TEMPERATURE OF TWO WELSH LAKES AND ITS EFFECT ON THE DISTRIBUTION OF TWO FRESHWATER INSECTS,
University Coll. of North Wales, Bangor. Dept. of Zoology.
J. E. Brittain.
Hydrobiologia, Vol. 48, No. 1, 1976, p 37-49, 1 fig, 25 ref.

Descriptors: Environmental effects, *Temperature, *Lakes, Freshwater, *Distribution, Insects, Mayflies, Stoneflies, *Aquatic insects, Water pollution effects.
Identifiers: *Wales.

Over a two year period of the study, temperature regimes in the littoral zones of two lakes in North Wales were found to be similar despite the different situations of the two lakes. Although regional weather factors seemed to be of more importance than local variations it was noted that in warm anticyclonic summer weather when water temperatures exceeded 20C during the day the temperature fell to below 20C in Llyn Dinas during the night, while Llyn Coron often remained above 20C throughout the night. Two common species, Nemoura avicularis Morton and Leptophlebia vespertina (L.), in Llyn Dinas were absent from Llyn Coron. Investigations of nymphal temperature tolerance and the effect of temperature on egg development and emergence led to the conclusion the differences in temperature regime between the two lakes were insufficient to explain the absence of the two species from Llyn Coron. (Chilton-ORNL)
W77-00878

HYDRAZINE DEGRADATION IN AQUATIC SYSTEMS,
Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio.
A. R. Slonim, and J. B. Gisclard.
Bulletin of Environmental Contamination and Toxicology, Vol. 16, No. 3, 1976, p 301-309, 6 tab, 9 ref.

Descriptors: *Chemical degradation, Aquatic environment, Water pollution effects, Fish, Analytical techniques, Organic matter, Biodegradation, Pollutant identification.
Identifiers: *Hydrazine degradation.

A polarographic technique was developed to determine if hydrazine is stable or degrades in various types of aquatic systems. Three experiments reported consisted of analyzing hydrazine in water from very dirty water filled with much organic debris following a rainstorm to clear, softened municipal water. Addition of hydrazine showed that, within the first couple of hours, the most polluted water caused a hydrazine breakdown to below one-third of its original level. The rate of degradation was highest within the first 24 hours in those samples showing immediate change in hydrazine content, and the hydrazine concentration approached its lowest level on the second day. Clear, soft water containing no organic matter did not degrade hydrazine until the second day and only about 35% by the fourth day. To investigate the extent to which hydrazine is taken up by fish, hydrazine concentration was compared between water samples with and without guppies. In hard water, differences between the samples increased with time while no detectable difference was found in soft water. (Chilton-ORNL)
W77-00879

SEASONAL TEMPERATURE EFFECTS AND PREDICTING DEVELOPMENT RATES OF MARINE COPEPOD EGGS,
Washington Univ., Seattle. Dept. of Oceanography.
M. R. Ladry.
Limnology and Oceanography, Vol. 20, No. 3 May 1975, p 434-440, 3 fig, 1 tab, 20 ref.

Descriptors: Environmental effects, *Temperature, *Seasonal, *Marine animals, *Growth rates, Eggs, *Copepods, *Forecasting, Resistance, *Heat resistance.
Identifiers: Acclimation temperature, *Acartia clausi eggs.

The purpose was to show that the development of Acartia clausi eggs is affected by seasonal temperature acclimation of the female copepod. Eggs from animals collected at 8-10C showed significantly faster development rates under conditions of 15-20C than did those collected at 18-20C. It is suggested that when temperature acclimation and tolerance effects are considered, the relative egg development of arctic and temperate marine copepods follows the same temperature dependent function rather than individual unique functions. (Chilton-ORNL)
W77-00880

REVEALING CERCARIA OF THE FAMILY SCHISTOSOMATIDAE IN THE KIEV WATER RESERVOIR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
M. I. Chernogorenko.
Med Parazitol Parazit Bolezn 44(2), p 222-224, 1975.

Descriptors: Reservoirs, *Trematodes, Invertebrates, *Worms, *Animal parasites, *Mollusks, Larvae, Fish diseases.
Identifiers: Bilharziella-polonica, Coretus, Lymnaea-stagnalis, Physa, Rudix, *Schistosomatidae, Trichobilharzia-ocellata, Ukrainian-SSR, *Kiev Reservoir(USSR).

High rates of mollusc infestation with trematode larvae of the family Schistosomatidae were observed in the 1st years of existence of the Kiev water reservoir (Ukrainian SSR, USSR). In subsequent years it decreased considerably due to decreased parasite density as a result of decreased water levels and drainage of shallow waters. The maximum excretion of Trichobilhazgia oceltata cercariae from molluscs Lymnaea stagnalis occurs in the morning and evening hours. Bilharziella polonica, Rudix, Coretus and Physa were also found.--Copyright 1976, Biological Abstracts, Inc.
W77-00881

DIVERSITY OF MARINE INVERTEBRATES IN A THERMAL EFFLUENT,
Delaware Univ., Lewes. Coll. of Marine Studies.
D. T. Logan, and D. Maurer.
Journal Water Pollution Control Federation, Vol. 47, No. 3, March 1975, p 515-523, 5 tab, 2 fig, 31 ref.

Descriptors: *Environmental effects, *Thermal pollution, *Marine animals, Temperature, Heated water, Water pollution effects, Invertebrates.
Identifiers: *Species diversity.

It has been hypothesized that species diversity may be used to determine the effect of a pollutant on a community with pollution tending to reduce the value of the diversity index. Data from this study show that an area of unusually high diversity may exist in a thermal effluent at the mouth of a discharge canal. A suggested explanation for this condition is that the mouth of the discharge canal is subject to large temperature variations. If a large portion of the community at this location is destroyed during intermittent, severe temperature changes, the ensuing periods of more stable conditions will be periods of recolonization and there will be little species interaction. No species will have gained dominance through interaction and diversity may be unusually high in these pioneer communities. (Chilton-ORNL)
W77-00883

SEASONAL AND LABORATORY VARIATIONS IN THE HEALTH OF GRASS SHRIMP PALAEMONETES PUGIO: DODECYL SODIUM SULFATE BIOASSAY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Effects Lab.
H. E. Tatem, J. W. Anderson, and J. M. Neff.
Bulletin of Environmental Contamination and Toxicology, Vol. 16, No. 3, 1976, p 368-375, 2 tab, 21 ref.

Descriptors: Environmental effects, *Toxicity, *Resistance, *Shrimp, Laboratory tests, Organic compounds, *Bioassay, Temperature, Salinity, Seasonal, Water pollution effects.
Identifiers: Dodecyl sodium sulfate, DSS, Palaemonetes pugio.

The purpose was to determine the seasonal variation in the resistance of grass shrimp to dodecyl sodium sulfate (DSS) and the organism's response to DSS after time in the laboratory. Data indicated that grass shrimp tolerated substantial concentrations of DSS in comparison to marine fish and crustaceans. Palaemonetes tolerated higher levels of DSS when collected in spring and summer months and showed significant decreases in resistance to the standard toxicant with time in the laboratory even while appearing normal and healthy. Results suggested that toxicity testing should be begun as soon as possible after organisms are collected, with temperature and salinity parameters similar to field conditions. (Chilton-ORNL)
W77-00884

THE RELATIONSHIP OF MALATHION AND ITS METABOLITES TO FISH POISONING,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
G. H. Cook, J. C. Moore, and D. L. Coppage.
Bulletin of Environmental Contamination and Toxicology, Vol. 16, No. 3, 1976, p 283-290, 3 tab, 23 ref.

Descriptors: Environmental effects, *Pesticides, Fish, Metabolism, *Bioassay, Enzymes, Biochemistry, Laboratory tests, Mortality, *Toxicity, Water pollution effects, Pollutant identification, Monitoring.
Identifiers: *Malathion, Malaoxon.

The purpose was to determine the relation of short-term measurability of malathion and some of its metabolites in fish to poisoning of fish in the laboratory. Degree of poisoning was determined by brain acetylcholinesterase inhibition and deaths in exposed populations. Residues of malathion or malaoxon were not found in any body tissue in concentrations greater than 0.10 microg/g after 24 hr exposure to 75 microg malathion/1. However, malathion monoacid and diacid were found in all tissues with the greatest residues in gut and liver, indicating rapid conversion of malathion to other compounds. The data showed accumulation of monoacid in the gut that coincided with phosphorylation of acetylcholinesterase in brain and poisoning in short-term continuous exposure to relatively constant levels of malathion in seawater. It was concluded that monitoring by chemical analyses of sensitive fishes or water for malathion or malaoxon would not show poisoning caused by enzyme-bound metabolites but that analysis for malathion monoacid in gut and measurement of brain acetylcholinesterase activity in fish would be a practical measure of poisoning caused by malathion. (Chilton-ORNL)
W77-00885

THE EFFECT OF GRAVEL DREDGING ON RESERVOIR PRIMARY PRODUCTION, INVERTEBRATE PRODUCTION, AND MUSSEL PRODUCTION.
Tennessee Wildlife Resources Agency, Nashville.
P. Yokley, Jr., and C. H. Gooch.
Completion Report, August 1976. 38 p, 14 fig, 4 tab. PL88-300, Proj. 2-245-R.

Descriptors: *Water pollution effects, *Dredging, *Reservoirs, *Gravels, *Mussels, *Aquatic life, Sediments, *Primary productivity, Invertebrates, *Tennessee River.
Identifiers: Substrates.

The objectives of this study were to find those methods and organisms that reveal best the effects of gravel dredging on the biotic communities. The resilience of the Tennessee River is not the same along its length nor are the organisms equally capable of bouncing back to their original densities. Plankton appears to be least affected by the gravel dredging when comparing those organisms studied. Also the fast moving water continually restores the lost plankton almost immediately after it is lost. Recruitment of any lost plankton occurs very quickly. The macrobenthos, including arthropods, annelids, flatworms, and coelenterates are also quickly replaced from surrounding populations as colonization or artificial substrates indicates, but silt does reduce the densities of these organisms below dredging. Freshwater mussels are sedentary and have low resilience requiring much longer time to bounce back. Many of the fish species that serve as hosts to freshwater mussels are not tolerent to silt. The ecological role of mussels has not been completely evaluated but it is known that the quality of water they inhabit is usually good. Mussels do filter suspended or organic matter from the water and improve its quality for fish and other swimming forms. (NOAA)
W77-00895

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 1. MARINE MAMMALS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00901

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 2, MARINE BIRDS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00902

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 3. MARINE BIRDS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00903

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 4. MARINE BIRDS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00904

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 5. FISH, PLANKTON, BENTHOS, LITTORAL.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00905

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 6. FISH, PLANKTON, BENTHOS, LITTORAL.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W77-00906

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 7. FISH, PLANKTON, BENTHOS, LITTORAL.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W77-00907

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 8, EFFECTS OF CONTAMINANTS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W77-00908

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 9. CHEMISTRY AND MICROBIOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W77-00909

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 10. CHEMISTRY AND MICROBIOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W77-00910

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME II. PHYSICAL OCEANOGRAPHY AND METEOROLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00911

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 12. GEOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00912

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 13. GEOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00913

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 14. ICE.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
For primary bibliographic entry see Field 6G.
W77-00914

AN ECONOMIC ANALYSIS OF THE ENVIRONMENTAL IMPACT OF HIGHWAY DEICING,
Abt Associates, Inc., Cambridge, Mass.
D. M. Murray, and U. F. W. Ernst.
Report EPA-600/2-76-105, May 1976. 137 p. 15 fig., 8 tab., 331 ref., 2 append. 68-03-0442.

Descriptors: *Snow removal, *Salts, *Highway icing, *Costs, *Damages, Water supply, Trees, Bridges, Corrosion, Groundwater, Public health, Water pollution effects, Cost comparisons, Air pollution.
Identifiers: *Highway deicing, Automobile corrosion.

The effects of salt use for highway deicing and snow removal on water supplies, lakes, and rivers; on trees and other vegetation; on bridges; on vehicles; on underground power transmission lines; and on public health are discussed. By analyzing available data it is estimated that the minimal an-

nual costs of salt use to the snowbelt states approximates $3 billion, distributed as follows: Surface and groundwater water supplies with the potential for irreversible public health damage to the hypertension-sensitive segment of the population - $150 millions; vegetation - $50 millions; highways and bridges - $500 millions; vehicles - $2000 millions; underground power transmission lines - $10 millions; and salt purchases and application - $200 million. The damage cost is almost 15 times the annual national budget for the purchase and application of road salt, and about six times the entire annual national budget for snow and ice removal. It is recommended that the level of salting be reduced by an amount determined by local conditions and that greater emphasis should be placed on plowing and sanding snow removal methods. Educational programs should be instituted to alert the public to the extent of salt damage and greater emphasis should be placed on driver training under winter conditions. (Auen-Wisconsin)
W77-00923

AQUATIC OLIGOCHAETA RECOREDED FROM CANADA AND THE ST. LAWRENCE GREAT LAKES,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
For primary bibliographic entry see Field 2H.
W77-00925

MUNICIPAL PHOSPHORUS LOADINGS TO LAKE ERIE, AN EVALUATION STUDY PREPARED FOR THE GREAT LAKES WATER QUALITY BOARD.
International Joint Commission-United States and Canada, Windsor (Ontario). Great Lakes Water Quality Board.
For primary bibliographic entry see Field 5B.
W77-00926

ASBESTOS IN THE GREAT LAKES BASIN WITH EMPHASIS ON LAKE SUPERIOR, A REPORT TO THE INTERNATIONAL JOINT COMMISSION FROM THE GREAT LAKES RESEARCH ADVISORY BOARD.
International Joint Commission-United States and Canada, Windsor (Ontario). Great Lakes Water Quality Board.
For primary bibliographic entry see Field 5B.
W77-00927

CLADOPHORA IN THE GREAT LAKES,
Limnos Ltd., Toronto (Ontario).
J. Neil.
International Joint Commission, Great Lakes Research Advisory Board, Workshop Proceedings, February 19-21, 1975, Windsor, Ontario, H. Shear and D. E. Konasewich, editors. 188 p.

Descriptors: *Chlorophyta, *Cladophora, *Great Lakes, *Conferences, *Nuisance algae, History, Habitats, *Distribution, *Biomass, Photosynthesis, Phosphorus, Nitrogen compounds, Economic impact, Beneficial use, *Standing crops, Remote sensing, *Productivity, *Nutrient requirements, Food chains, Chemical properties, Radioisotopes, Heavy metals, *Absorption, Pesticides, Bioassay, Growth rates, Niches, Ecology, *Algal control, Nutrient removal, Harvesting, Chemcontrol, Biocontrol, International Joint Commission.

Everything you want to know about Cladophora--its history in the Great Lakes, distribution, biomass standing crop and production, its ecological and chemical requirements, its growth rates in response to temperature, its uptake and accumulation of cations, and its nutrient requirements--are discussed in this workshop proceedings. Presentations also relate to Cladophora's propensity to accumulate heavy metals, pesticides, and radionuclides and the effects of that uptake on the food chain, the possible utilization of this bioaccumulation as a pollutant removal agent, and as a bioassay eutrophication indicator. Also detailed are the ecology of the Cladophora niche, and effectiveness of control methods, including phosphorus limitation, physical removal, chemical and biological control. The socio-economic impact of this nuisance algae is related to impaired water use, reduction of recreation value, devaluation of property, and effects on fisheries. Potential beneficial uses of Cladophora may be as animal fodder, as fertilizer and mulch, utilization of its biocidal products, as a fiber for paper-making, and for treating waste effluents containing low levels of heavy metals and radioactive substances. (Auen-Wisconsin)
W77-00928

WATER POLLUTION INVESTIGATION: BLACK RIVER OF NEW YORK.
Hydroscience, Inc., Westwood, N. J.
For primary bibliographic entry see Field 5B.
W77-00929

AN APPROACH TO A RELATIVE TROPHIC INDEX FOR CLASSIFYING LAKES AND RESERVOIRS. (A PRELIMINARY ANALYSIS OF NATIONAL EUTROPHICATION SURVEY DATA COLLECTED DURING THE 1972 SAMPLING PERIOD).
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
Available from the National Technical Information Service, Springfield, VA 22161, as PB-242 336, Price codes: A04 in paper copy, A01 in microfiche. Working Paper No. 24, December 1974. 44 p, 1 fig, 6 tab, 10 ref, append.

Descriptors: *Trophic level, *Lakes, *Classification, Phosphorus, Nitrogen, Secchi disks, Chlorophyll, Dissolved oxygen, Methodology, *Reservoir.
Identifiers: *Trophic index system.

A lake Trophic State Index, incorporating the parameters of total phosphorus, dissolved phosphorus, inorganic nitrogen, Secchi disc, minimum dissolved oxygen, and chlorophyll-a, and ranging from 0 to 594 was developed to classify 209 lakes and reservoirs in the northeast and north-central states by using the data collected by the National Eutrophication Survey. Lakes with a Trophic Index Number of 500-594 were oligotrophic while those with an index number of 420-499 were mesotrophic. Below an index number of 420, the lakes became progressively more eutrophic with the lower index numbers corresponding to a higher potential for developing nuisance algae. Lakes in which the eutrophication problem is primarily aquatic macrophytes generally do not fit this index system; however, this is generally true of similar classification systems. For phosphorus limited lakes, the proposed Trophic Index Numbers correspond well to Vollenweider's (1973) phosphorus loading-lake morphometry-trophic state relationships. The proposed index system provides a relative method by which previously unclassified lakes could be classified after the appropriate parameters have been measured. The index could also be used to evaluate year to year changes in trophic conditions of a specific lake. The applicability of this index to lakes in other geographical areas is questionable. (Auen-Wisconsin)
W77-00930

NITROGEN AND PHOSPHORUS IN WASTEWATER EFFLUENTS. (A PRELIMINARY ANALYSIS OF NATIONAL EUTROPHICATION SURVEY DATA COLLECTED DURING 1972-73 SAMPLING PERIOD).
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 335, Price codes: A06 in paper copy, A01 in microfiche. Working Paper 22, July 1974. 80 p. 6 tab., 5 ref., 1 append.

Descriptors: *Eutrophication, *Sewage effluents, *Nitrogen, *Phosphorus, Surveys, Alabama, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, North Carolina, South Carolina, Ohio, Pennsylvania, Tennessee, West Virginia, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, New Hampshire, New Jersey, New York, Rhode Island, Vermont, Virginia, Wisconsin, Sewage treatment.

A survey of sewage treatment plants in 27 states of the eastern third of the United States indicated that the median total phosphorus content in sewage effluents ranged from 3.4 mg/1 to 8.8 mg/1. The lowest concentrations were achieved by those states which either had phosphate detergent bans or were using phosphorus removal processes. Median total nitrogen concentrations by state ranged from 10.46 mg/1 to 19.10 mg/1. Median P and N loads, based on population served, were 2.2 lbs total P/capita/yr and 6.0 lbs of total N/capita/yr. Those facilities which specifically practiced phosphorus removal had a median total phosphorus concentration of 2.53 mg/1, less than 50% of the median value of conventional treatment processes. Only 54% of the total phosphorus discharged after primary treatment was dissolved ortho-phosphorus whereas following various types of biological treatment, 72-83% of the total was orthophosphorus, which is readily available to algae. Total nitrogen and ammonia nitrogen concentrations were highest in effluents from primary treatment facilities and lowest in oxidation pond effluents. The average N:P ratio in the effluents of all sampled plants was 2.5:1 and the range 1.9:1 to 5.2:1 for different types of treatment processes. There is little potential for controlling eutrophication by nitrogen removal. (Auen-Wisconsin).
W77-00931

MAN'S EFFECT ON THE QUALITY OF OUR WATER,
Central and Southern Florida Control District, West Palm Beach.
J. Browning.
In Depth Report, West Palm Beach, Vol 1, No 2, p 1-8, February 1972. 12 p, 2 tab.

Descriptors: *Water pollution, *Urban runoff, Agriculture, *Water pollution effects, *Runoff, Rainfall-runoff relationships, Storm water, Storms, Storm runoff, Water supply, Water sources, Water pollution control, Administrative agencies, Bacteria, Sewerage.

Background material is presented on pollution as it occurs through agricultural, urban, and storm runoff. South Florida's forecast is encouraging in that the Florida Department of Pollution Control has successfully required non-polluting waste disposal. One remaining problem is that urban runoff bacteria levels in street gutters are extremely high. The optimum solution will be to eliminate much of the trash and debris which finds their way into the waterbodies during rainstorms. Agricultural pollution runoff can be controlled through the use of private, small reservoirs. Tables are given which show characteristics of storm water and pollutant levels according to land use type. (Frank-Florida)
W77-00974

INDEPENDENCE OF THE BIOCHEMICAL AND SPECIES COMPOSITION OF PLANKTON OF THE MINGECHAUR AND VARVARA RESERVOIRS, (IN RUSSIAN),
For primary bibliographic entry see Field 2H.
W77-01018

PHYSICAL-CHEMICAL AND PLANKTONOLOGICAL QUANTITATIVE STUDIES OF

THE GREAT LAKE OF LAFFREY (YEARS 1970, 1971 AND 1973), (IN FRENCH),
Bordeaux-3 Univ., Talence (France). Lab. of Zoology.
M. Gachet, B. Serra-Tosio, and J. Tetart.
Trav Lab Hydrobiol Piscicult Univ Grenoble 64/65, p 7-24, 1974.

Descriptors: *Ions, Lakes, *Phytoplankton, Europe, *Benthos, Zooplankton, Copepods, Crustaceans, Eutrophication, Algae.
Identifiers: Anura, Asplanchna, Asterionella-sp, Dinobryon, Fragilari-sp, France, Notholca, Pediastrum, Peridinian, Polyarthra-sp, Stephanodiscus, Synedra, *Great Lake of Laffrey(France).

The principal ions in the lake were studied as a function of depth, at various times of the year. Phytoplankton was present in large numbers in Lake Laffrey (France): up to 1425 individuals/l near the bottom (30 m). At the surface the phytoplankton population was 885 individuals/l. The phytoplankton was represented principally by Asterionella sp. and Fragilaria sp. The forgme is plentiful near the surface, while the second dominates at 12-20 m. Pediastrum and Dinobryon sp. remain localized below 6 m. Synedra abounds at the surface and disappears at 4 m, reappearing at 20 m. Stephanodiscus sp. appear only at the bottom, while the peridinians develop between the surface and 30 m. The zooplankton is made up of rotifers and crustaceans. The rotifers are generally found near the top. Asplanchna is absent at the surface but present between 2 and 12 m. Anura sp. are most numerous near the surface; Polyarthra sp. appears at 10-15 m; Notholca is scarce near the surface and reaches a maximum at 6 m. The crustaceans are regrouped into Cladocera and Copepoda; the latter include Cyclopoids, Calanoids and nauplii stages. A clear predominance of diatoms is reported compared with other planktonic algae, which shows that the lake has not reached an advanced state of eutrophication.
W77-01019

A COMPARISON OF BENTHIC COMMUNITIES OF STRUJNJAN AND KOPER BAYS WITH REGARD TO THEIR DIFFERING EXPOSURE TO POLLUTION STRESS, (IN SLOVENIAN),
Ljubljana Univ. (Yugoslavia). Morska Biologijo Postaja.
A. Avcin, N. Mith-Avcin, A. Vukovic, and B. Vriser.
Biol Vestin 22(2), p 171-207, 1974.

Descriptors: Bays, Europe, Biomass, Benthos, Sewage, Water pollution effects, Algae, Tolerance.
Identifiers: *Cymodocea-Nodosa, Halopithys-Incurvus, Ulva-Rigida, Y. Joslavia, Koper Bay(Yugoslavia), Strujnjan Bay(Yugoslavia).

Plant biomass data and measures of diversity and similarity of benthic species from transection samples of 2 coastal bays in the north Adriatic (Yugoslavia) are compared and analyzed. Until recently, the bays were floristically and faunistically nearly identical, but one of them is now heavily polluted by raw sewage from the town of Koper. Strunjan Bay, representing natural conditions, is characterized by a sea grass (Cymodocea nodosa) community which covers most of the bottom to a depth of 8 m, below which a rich infaunal community within the soft clay sediments is found. In the shallow, heavily-polluted part of Koper Bay, C, nodosa has been eliminated and the resulting space is now inhabited by the algae Ulva rigida and Halopithys incurvus. The total number of species found to a depth of 4 m is reduced to half of that of the analogous portion of Strunjan Bay. The remaining, pollution-tolerant species are represented in huge number up to 20,000 m2, probably largely due to the elimination of predators. The area of maximum pollution is limited to the inner part of Koper Bay. The community composition from deeper areas (8-10 m) does not differ from the analogous part of Strunjan Bay.--Copyright 1976, Biological Abstracts, Inc.
W77-01024

GROWTH AND PRODUCTION OF MASS SPECIES OF CHIRONOMIDS (DIPTERA, TENDIPEDIDAE) IN THE VOLGA PRE-DELTA, (IN RUSSIAN),
Kaspiiski Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Astrakhan (USSR).
M. S. Aleksevnina.
Zool Zh 53(5), p 720-727, 1974.

Descriptors: Biomass, *Diptera, Larvae, *Productivity, *Growth rates, Deltas.
Identifiers: Fleuria-Lacustris, Polypedilum-Nubeculosum, *Tendipedidae, *Volga pre-delta(USSR).

Production is calculated for 3 mass species of chironomid larvae in the Volga pre-delta (USSR): Polypedilum nebeculosum, Fleuria lacustris, Chironomus sp. (form semireductus-plumosus). The calculation was based on A.S. Konstantinov's method of summation of relative diurnal increments of larval biomass during a definite period. The production of the species in question was 16.0-34.7 times higher than the average biomass during the same period. The ratio between the production and the maximum biomass (P/B max) attained 2.0-6.8 P. nubeculosum characterized by a short life cycle and high numbers had high values of P/B max (6.8 and 5.3). These values were lower in F lacustris and Chironomus sp. characterized by a slower development rate (2.9 and 3.4, 2.9 and 3.1, respectively). These values match those for eutrophic water bodies. The production of F. lacustris calculated by the graphic method (Vinberg, 1968) agrees with the values obtained.--Copyright 1976, Biological Abstracts, Inc.
W77-01025

PLANKTON COMMUNITIES OF THREE MAZURIAN LAKES AND CHLOROPHYLL CONTENT IN THEIR PHYTOPLANKTON, (IN POLISH),
Instytut Rybactwa Srodladowego, Olsztyn-Kortowo (Poland).
J. Sosnowska.
Monogr Bot 42, p 1-152, 1974.

Descriptors: *Phytoplankton, *Chlorophyll, Europe, Lakes, Eutrophication, Mesotrophy, Dystrophy, Water.
Identifiers: *Poland(Mazurian Lakes).

Plankton communities were investigated, with particular interest in the phytoplankton of 3 lakes in the Mazurian Lakeland county (NE Poland): b-mestrophic Lake Harsz, eutrophic Lake Lemiet and dystrophic Lake Smolak. The plankton communities of these lakes are characterized from the socialogical point of view and the quantitative results concerning phytoplankton are compared using 3 methods: the sociological method, counting the quantity of individuals per liter of water and chlorophyll measurements.--Copyright 1976, Biological Abstracts, Inc.
W77-01029

LIPID TRANSFORMATION IN SEAWATER BY OIL-OXIDIZING MICROORGANISMS, (IN RUSSIAN),
Institute of Biology of the Southern Seas, Sevastopol (USSR). Dept. of Marine Sanitation Hydrobiology.
For primary bibliographic entry see Field 5A.
W77-01030

ENZYMATIC IN SITU MEASUREMENTS: NEW SEAWATER AND SEDIMENT MEASUREMENT METHODS, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskude.
For primary bibliographic entry see Field 5A.
W77-01031

NUMBER AND BIOMASS OF OLIGOCHAETA OF THE SPECIES POTAMOTHRIX HAMMONIENSIS MICH. IN LAKES DUSIA, GALSTAS, OBELIJA AND SLAVANTAS IN 1968-1971, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius. Institut Zoologii i Parazitologii.
A. I. Grieyalis.
Liet Tsr Nokslu Akad Darb Ser C Biol Mokslai 2, p 53-59, 1975.

Descriptors: *Biomass, *Lakes, Europe, *Oligochaetes, *Temperature.
Identifiers: Lake Dusia, Lake Galstas, *Lithuanian-SSR, Lake Obelija, *Potamothrix-Hammoniensis, Lake Slavantas, USSR.

The largest number P. hammoniensis Mich. in 1969 and 1970 was in Lake Dusia (Lithuanin SSR, USSR). The number varied in the wide boundary from 600-1400 worms/m2. The smallest number of oligochaete biomass was in Lake Slavantas, especially in 1970. The largest oligochaete biomass was in Lake Dusia which is of average thermal depth. The smallest biomass was in thermal deep Lake Slavantas. The largest average weight (9.55-10.00mg) of P. hammoniensis was in thermally shallow Lake Obelija in Feb. 1968. The largest specimens (20-29 mm in length) were in thermally shallow Lake Obelija and in Lake Dusia. P. hammoniensis comprised the largest part of the zoobenthos (80-90%) in the average lakes and the smallest part of the zoobenthos (15-50%) in thermally shallow Lake Obelija and in thermally deep Lake Slavantas (0.1-24.8%).--Copyright 1976, Biological Abstracts, Inc.
W77-01033

THE TIME AND THE CAUSE OF EXTERMINATION OF LAKE BALLS FROM LAKE ZELLER, (IN JAPANESE),
Yamagata Univ. (Japan). Dept. of Biology.
S. Nakazawa.
Bull Jpn Soc Phycol 22(3), p 101-103, 1974.

Descriptors: *Cladophora, Lakes, Europe, Fishing, Succession, Water pollution, Beaches, Nets.
Identifiers: *Cladophora-Sauteri, *Lakes balls(Cladophora), *Lake Zeller(Austria).

Reports of Sauter, Lorenz, Keissler, a letter of the Mayor Alois Latini of Zell am See, and original investigation of Lake Zeller (Austria) in 1972, were compared. The lake balls of Cladophora sauteri were apparently exterminated from Lake Zeller between 1900-1909. The cause of the extermination may be a combination of several factors: natural succession, change in water by human contamination, loss of shallow beaches by embankment and mechanical damage of the lake bottom by fishing nets.--Copyright 1976, Biological Abstracts, Inc.
W77-01034

STUDIES ON THE INCIDENCE OF ENCYSTED LARVAE OF PARAGONIMUS MIVAZAKII KAMO ET AL, 1961 IN THE CRAB POTAMON DEHAANI IN SHIZUOKA PREFECTURE, JAPAN, (IN JAPANESE),
Shizuoka Univ. (Japan). Hygiene Lab.
J. Ito, and H. Mochizuki.
Jpn J Parasitol 24(4), p 241-249, 1975.

Descriptors: *Human diseases, Asia, Larvae, *Crabs, Water pollution effects.
Identifiers: *Japan, *Paragonimus-miyazakii, *Potamon-dehaani, Shizuoka Perfecture.

Humans have become infected with P. mivazakii due to contact with contaminated P. dehaani. Of 1874 crabs (P. dehaani) collected in Shuizuoka Prefecture, Japan, and examined for metacercariae of P. mivazakii, 275 (14.7%) were positive. The dis-

tribution was limited to the western half of the prefecture. The highest incidence rate found in the Ooi River basin (34.4%); rates were 13.4% in Oota River, 31.7% in Tenryu River and 1.7% in Miyakoda River. The number of cysts per crab host was 1-24, with an average of 3.3. Metacercariae were most often found in the pericardial cavity, usually attached to the heart of the crab. No correlation between infection rate and size or sex of the crab was observed.--Copyright 1976, Biological Abstracts, Inc.
W77-01036

STUDIES ON THE BOTTOM FAUNA OF FIVE LAKES IN SOUTHERN HOKKAIDO (LAKES HIKOTSU-KO, KUTTARA-KO, TOYA-KO, HANGETSU-KO AND OSHIMA O-NUMA, (IN JAPANESE),
Mieken Science Education Center, Yokkaichi (Japan).
N. Kitagawa.
Jpn J Limnol 36(2), p 48-54, 1975.

Descriptors: *Lakes, Asia, *Bottom deposits, Benthos, Mesothropy, Chironomids, Dissolved oxygen, Larvae.
Identifiers: *Chironomus-plumosus, Hangetsu-Ko, Hokkaido, *Japan, Kuttara-ko, Lakes, O-numa, Oshima, Procladius-sp, Shikotsu-ko, Toya-ko, *Tubifex-sp, Profundal zone.

In Lake Shikotsu-ko, only Tubifex sp. occurred in the profundal zone deeper than 350 m. Some kinds of chironomid larvae were found in the littoral zone. The dissolved O2 is rich throughout. In Lake Kuttara-ko, no macroscopic animals were found deeper than 138 m. Tubifex sp. Procladius sp. occurred in the zone shallower than 138 m, though not abundant. Transparency was 18 m. This is the highest value of the 9 lakes in Hokkaido (Japan) investigated. In Lake Toya-ko, some kinds of chironomid larvae were found in the littoral zone, but not in the profundal zone. Tubifex sp. occurred widely over the bottom. In Lake Hangetsu-ko, no macroscopic animals were found on the bottom. The deoxygenated layer extends for several meters at the deepest zone. In Lake Oshima O-numa, Chironomus plumosus is dominant in the profundal zone. This lake is a mesotrophic plumosus lake.--Copyright 1976, Biological Abstracts, Inc.
W77-01037

THE PHYSICAL-CHEMICAL CONDITIONS OF THE WATERS OF THE LAKE OF ORTA DURING THE PERIOD FROM 1964 TO 1970, (IN ITALIAN),
F. M. Biffi, M. Picotti, and D. Tajana.
Boll Pesca Piscic Idrobiol 27(1), p 1-42, 1972.

Descriptors: *Lakes, Europe, Epilimnion, Hypolimnion, *Carbon dioxide, Ions, Oxidation, Oxygen, Phytoplankton, Heated water, Hydrogen ion concentration.
Identifiers: *Italy(Lake of Orta).

Thermal inversion in the waters (in Italy) occurs annually in later winter and reaches the greatest depths every year. The oxygenation of the epilimnion is normal; that of the hypolimnion is scanty especially in the period of summer-autumn stratification. The deep layers always show high CO2 content, which decreases at the end of the winter period after the exchange of the deep waters. In the surface layers the CO2 content is fairly normal with a slight increase in the period in which the ascent of the deep water layers occurs. Similar behavior is shown by the pH. NH4 in view of the H+ concentration, is present in ionic equilibrium with anions of the available acids, especially carbonic acid. NO2, as intermediate products of physico-chemical and biological oxidation have a concentration stabilized around 3000 gamma (3000 micro g/l, with a tendency, in recent years, to decrease through phytoplankton consumption. Cu and Cr contents are also given.--Copyright 1976, Biological Abstract, Inc.
W77-01038

DISTRIBUTION OF THE PHYTOPHYLIC INVERTEBRATES AND METHODS OF THEIR QUANTITATIVE ESTIMATION, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
Gidrobiol Zh. (6), p 51-58, 1973.

Descriptors: *Distribution, *Invertebrates, *Zooplankton, Estimating.
Identifiers: Ceriodaphnia-pulchella, Chydorus-sphaericus, Eucyclops-serrulatus, Eurytemora-velox, Glyceria-sp, Polyphemus-pediculus, Potamogeton-sp, Quantitative, Scapholeberis-mucronata, Sida-crystallina, Simocephalus-vetulus, *Phytophylic invertebrates.

Zooplankton occurrence obeys the law of normal distribution. The accuracy of quantitative zooplankton estimation with 9-10 samples taken, when sample volume is convenient, reaches 8-10%. The estimation accuracy depends on the characteristics of the substrate, as well as on biological and ecological zooplankton (Sida crystallina, Simocephalus vetulus, Ceriodaphnia pulchella, Scapholeberis mucronata, Chydorus sphaericus, Polyphemus pediculus, Eucyclops serrulatus, Eurytemora velox) peculiarities, e.g., its ability to form shoal. The irregular distribution of the zooplankton is described by the coefficient of variation. The estimation accuracy increases when the greatest variety of size and ecologically different aggregations, all forming a phytophylic biocenosis, is covered by the survey. (Samples from Glyceriasp., Zander and Potmmogeton sp. were used.).--Copyright 1976, Biological Abstracts, Inc.
W77-01040

DISTRIBUTION AND SIGNIFICANCE OF FECAL INDICATOR ORGANISMS IN THE UPPER CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Microbiology.
G. S. Saylor, J. D. Nelson, Jr.,, A. Justice, and R. R. Colwill.
Applied Microbiology, Vol 30, No 4, October 1975, p 625-638, 7 tab, 8 fig, 13 ref.

Descriptors: *Water pollution effects, *Water quality, Waste water(Pollution), Domestic wastes, Sewage, Environmental effects, Shellfish, Recreation, Temperature, Salinity, Bays, *Chesapeake Bay, *Bioindicators, *Distribution, Coliforms, Bacteria, Enteric bacteria, Streptococcus, Aerobic bacteria.
Identifiers: Heterotrophic bacteria.

The survey reported upon provides evidence of significant levels of pollution from human wastes in the water, sediment, and suspended sediment throughout the Upper Chesapeake Bay. Highest counts of pollution indicator organisms were found at the confluence of the Susquehanna River and the Chesapeake Bay. Organisms were found to be quantitatively distributed independently of temperature and salinity and were not correlated with concentration of suspended sediment. However, 53% of total viable bacteria and more than 80% of fecal indicator organisms were directly associated with suspended sediments. Correlation coefficients for the indicator organisms ranged from 0.80 for bottom water to 0.99 for suspended sediment. Prolonged survival for the fecal streptocci was seen in most of the sediment samples. Further deterioration in water quality would seriously affect shellfish harvesting and recreational uses of the Upper Chesapeake Bay. (Chilton-ORNL)
W77-01061

HYDROGEN ION CONCENTRATION IN THE GASTROINTESTINAL TRACT OF CHANNEL CATFISH,
Georgia Agricultural Experiment Station, Savannah.
J. W. Page, J. W. Andrews, T. Murai, and M. W. Murray.
Journal of Fish Biology, Vol. 8, 1976, p 225-228, 2 tab, 8 ref.

Descriptors: Biochemistry, *Aquatic animals, Fish, *Hydrogen ion concentration, Laboratory investigations, Temperature, *Channel catfish, Water pollution effects.
Identifiers: Gastrointestinal tract(Catfish).

Two groups of five channel catfish, with average weights of 892 and 134 g, were maintained at environmental temperatures of 23 and 28C. Highly acidic conditions were present in the stomachs of all fish with slightly higher pH values for the stomach contents of fish at 28C. The pH values increased to 7-9 in the duodenum and reached a maximum level of 8.6 in the upper intestinal region with a decrease approaching neutrality in the lower segments of the colon. Catfish of both sizes had a slightly lower pH throughout the intestinal tract at 28C than at 23C. The pH of the bile ranged from 6.1 to 7.5 and was higher in fish maintained at 28C. (Chilton-ORNL)
W77-01062

SEASONAL SHIFTS IN THE SPAWNING SITE OF A NORTHEAST PACIFIC INTERTIDAL FISH,
British Columbia Univ., Vancouver, B. C. Inst. of Animal Resource Ecology.
For primary bibliographic entry see Field 2L.
W77-01063

SEASONAL DISTRIBUTIONS OF LARVAL FLATFISHES (PLEURONECTIFORMES) ON THE CONTINENTAL SHELF BETWEEN CAPE COD, MASSACHUSETTS, AND CAPE LOOKOUT, NORTH CAROLINA, 1965-66,
National Marine Fisheries Service, Highlands, N. J. Sandy Hook Lab.; and National Marine Fisheries Service, Highlands, N. J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 2L.
W77-01064

MIXED FUNCTION MONOOXYGENASE OF FISH AS AN INDICATOR OF POLLUTION OF AQUATIC ENVIRONMENT BY INDUSTRIAL EFFLUENT,
Oulu Univ. (Finland). Dept. of Pharmacology.
J. T. Ahokas, N. T. Karki, A. Oikari, and A. Soivio.
Bulletin of Environmental Contamination and Toxicology, Vol. 16, No. 3, 1976, p 270-274, 1 tab, 18 ref.

Descriptors: Environmental effects, Water pollution, *Water pollution effects, Waste water(Pollution), Wastes, Industrial wastes, Fish, Aquatic environment, Enzymes, Pollutant identification, *Bioindicators, *Metabolism, *Pikes.
Identifiers: *Monooxygenase.

The pike (Esox lucius L.) was used to determine whether or not fish in polluted water have a higher in vitro capacity to metabolize foreign compounds than those in clean water. The overall trend, contrary to what had been previously reported, was that the fish from the polluted water showed a reduced in vitro mixed function monooxygenase (MFO) capacity. Preliminary exposure studies in which two other species of fish (Salmo trutta lacustris and Salmo gairdneri) were exposed to the polluted water on one and four week periods, did not develop changes such as those seen in pike chronically exposed to the contaminated waters. (Chilton-ORNL)
W77-01065

5D. Waste Treatment Processes

INFILTRATION LAGOONS FOR TERTIARY TREATMENT OF STABILIZATION POND EFFLUENT,
South Dakota State University, Brookings. Dept. of Civil Engineering.
J. N. Dornbush.
Available from the National Technical Information Service, Springfield, VA 22161, as PB-259 473, Price codes: A03 in paper copy, A01 in microfiche. South Dakota Water Resources Research Institute, Termination Report, March 1976. 38 p, 3 fig, 4 tab, 6 ref, 3 append. OWRT A-044-SDAK(1). 14-31-0001-5042

Descriptors: Suspended solids, Nitrogen compounds, *Tertiary treatment, *Oxidation lagoons, Effluents, *Induced infiltration, Nutrient removal, *Water reuse, *Water quality standards, *Waste water treatment, Water pollution, *Infiltration rates, Nitrogen, Phosphorus, Coliforms, Biochemical oxygen demand.
Identifiers: *Stabilization ponds, *Infiltration lagoons, Ammonia nitrogen, Nitrate nitrogen.

Infiltration lagoons were designed and operated to make maximum use of an in-place soil system to provide advanced treatment of stabilization pond effluents in order to meet future effluent standards. After a three-month period of summer operation of the pilot infiltration-percolation basins, the following preliminary conclusions are suggested. Preliminary lysimeter studies demonstrated that a high degree of treatment was provided by soil filtration although infiltration rates (one to two inches per day) in these studies were too low to be practical for a full-scale operation. Scarified pilot infiltration-percolation basins, operated with weekly applications of 18 and 24 inches of stabilization pond effluent were able to maintain infiltration rates in excess of 0.5 inches per hour throughout the summer. The original cover of alfalfa and brome grass maintained infiltration rates in excess of one inch per hour and crop growth thrived. Infiltration rates would not appear to be a deterrent factor in the design of practical, economical, infiltration-percolation basins. An effluent standard with concentrations of 10 mg/l of BOD5 and suspended solids would probably be met with a full-scale infiltration- percolation basin during the summer if it were constructed to preclude short-circuiting of wastewater to the ground water drains. With weekly applications of wastewater the oxidation of ammonia nitrogen to nitrates was indicated. Ammonia nitrogen reductions were accomplished and the effluent from the infiltration-percolation basins would have met a 1.5 mg/l ammonia nitrogen standard about 50 percent of the time. Nitrate nitrogen concentration excess of 10 mg/l might be expected to reach the ground water from infiltration-percolation basins operated on a weekly cycle of wastewater application if an adequate underdrain system were not installed. About 50 percent of the phosphorus applied with the wastewater was removed but effluent concentrations frequently exceeded 1.0 mg/l. Leaching of soluble salts from the soil is indicated by the higher conductivity of the effluent from the pilot basins.
W77-00540

DENITRIFICATION WITH A BACTERIAL DISC UNIT,
National Inst. for Water Research, Pretoria (South Africa).
T. R. Davies, and W. A. Pretorius.
Water Research, Vol. 9, No. 3, p 459-463, March 1975. 5 fig, 12 ref.

Descriptors: *Denitrification, *Bacteria, Anaerobic conditions, Anaerobic bacteria, Chemical reactions, *Waste water treatment, *Biological treatment.

An enclosed rotating disc unit was operated anaerobically as a denitrifying system, with methanol as the hydrogen donor. The C:N ratio necessary for complete denitrification was 2.6:1. Optimum pH for denitrification lay in the range between 7.0 and 8.5. Q sub 10 values were 1.38 between 10 and 30 C, -2.66 above 30 C and 13.06 below 10 C. (Skogerboe-Colo St)
W77-00550

OZONATION OF AMMONIA IN WASTEWATER,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
P. C. Singer, and W. B. Zilli.
Water Research, Vol. 9, No. 2, p 127-134, February 1975. 9 fig, 1 tab, 10 ref.

Descriptors: *Waste water, *Ozone, *Ammonia, *Waste water treatment, Phosphates, Municipal wastes, Tertiary treatment.
Identifiers: *Ozonation.

An investigation of the effects of ozone on ammonia in municipal wastewaters is described and discussed relative to the application of ozone for advanced waste treatment. Ammonia is oxidized completely to nitrate, thereby eliminating the nitrogeneous oxygen demand of the waste. In buffered solutions of ammonium chloride, the reaction is first-order with respect to the concentration of ammonia and the rate increases with increasing pH over the range 7-9, and with increasing ozone partial pressure. (Skogerboe-Colo St)
W77-00553

DEFUSING THE SEWAGE STINKBOMB ON THE TYNE.
Surveyor Public Authority Technology, Vol. 147, No. 4365, p 14-15, February, 1976. 1 fig.

Descriptors: *Sewage treatment, *Sewers, *Sewerage, *Storm water, Hydraulic structures, Construction, Pipelines, Rivers, Surface waters, Projects, Costs, *Combined sewers, Waste water treatment, Sewage disposal.
Identifiers: *Tyne River, Great Britain.

The Northumbrian Water Authority's Tyneside Sewerage Scheme is described. The aim of the scheme is to remove the sewage nuisance currently plaguing the Tyne by treating the sewage and then taking it out to sea. Total cost of the project is estimated at 65 million pounds, and project completion is scheduled for 1980. Once the main interceptor sewers are complete, efforts will begin to take pumped sewage from the low-lying areas between the interceptors and the river banks into the interceptor system. The foul sewer system has been designed for the year 2054; thus, everything is oversized for present flows. In the early stages of the scheme, some storm sewage will be accepted through a storm overflow system. The balance of the stormwater will go into the river. As the system reaches design capacity, it will revert gradually to two separate systems. (Kreager-FIRL)
W77-00559

AGGREGATION TREATMENT APPARATUS FOR WASTE WATER,
Denki Kagaku Kogyo Kabushiki Kaisha, Tokyo (Japan). (Assignee).
S. Motozawa, H. Itoga, H. Wada, and H. Marukawa.
United States Patent 3,970,562. Issued July 20, 1976. Official Gazette of the United States Patent Office, Vol. 948, No. 3, p 1103, July, 1976. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Flocculation, *Separation techniques, *Suspended solids, Equipment, Design criteria, Electrodes, Aggregates, Colloids, Metals.

A patent for an apparatus capable of aggregating suspended colloidal solids in waste water is described. The device consists of the following sections: a suspending stage in which metallic particles of metal oxide, or sintered metal oxide carrying an electrical charge opposite to that on the solids in the waste water are suspended in a feed flow of the waste water; an electrical aggregating stage in which the feed flow with suspended particles is passed between oppositely charged electrodes to flocculate oppositely charged particles and colloidal solids; and a separating stage in which the metallic particles are separated from the flocculant-containing water. The suspending and separating stages are formed as an integral unit having an inverted conical upper section and a means for introducing the flocculant-containing flow from the aggregating stage in a tangential direction adjacent to the upper end. A means for removing the collected flocculated matter and effluent water from an interior point of the conical section is also provided. (Kreager-FIRL)
W77-00560

SEWAGE SYSTEM,
B. E. Brennan.
United States Patent 3,972,650. Issued August 3, 1976. Official Gazette of the United States Patent Office, Vol. 949, No. 1, p 203-204, August 1976. 1 fig.

Descriptors: *Patents, *Sewage treatment, *Hydraulic equipment, *Design criteria, Valves, Sewage, Equipment, Waste water treatment.

A patent for a preassembled sewage collection unit designed for connection between a sewage source and a sewage discharge system is described. The sewage collection unit includes: a container having sewage inlet and outlet openings, each associated with a check valve; an air inlet connection and an air vent; a multi-stage valve assembly mounted within the upper portion of the container and connected to the air inlet and air vent; a cam which can be shifted between two limit positions and can be engaged by a pilot valve actuator; a float which can be shifted in response to the level of sewage in the container; and a quick-throw mechanism in the container which is responsive to variations in the level of the float for shifting the cam from one limit position to the other. The multi-stage valve assembly includes a pilot valve connected to the air inlet, a first pneumatically actuated valve connected to the air inlet and responsive to actuation of the pilot valve, and a second pneumatically actuated valve responsive to actuation of the first pneumatically actuated valve for discharging compressed air into the upper portion of the container. (Kreager-FIRL)
W77-00561

ELECTROCOAGULATION SYSTEM FOR REMOVING POLLUTANTS FROM WASTEWATER,
Swift and Co., Chicago, Ill. (Assignee).
E. R. Ramiriz.
United States Patent 3,969,245. Issued July 13, 1976. Official Gazette of the United States Patent Office, Vol. 948, No. 2, p 657, July 1976. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Separation techniques, *Coagulation, *Electrolysis, Bubbles, Flocculation, Waste treatment.
Identifiers: *Electrocoagulation.

A patent for an electrocoagulation method capable of removing pollutants from raw waste water is described. The method consists of the following steps: providing a bubble supply produced electrolytically by decomposing a flow of waste water; positioning the bubble supply as a cylindrically shaped dense zone of fine bubbles in a direction longitudinal to the flow of waste water; rapidly flowing the waste water through the dense zone of fine bubbles; turbulently contacting the fine bub-

bles with pollutants in the waste water to form a buoyant embryo floc within the waste water; venting the dense bubble zone to the atmosphere to prevent pressure buildup within the zone; removing the unseparated flow of waste water and embryo floc from the dense bubble zone such that some of the buoyant embryo floc is combined into a buoyant full floc; introducing the full floc and waste water into a downstream flotation basin such that the buoyant full floc rises to near the surface of the waste water in a manner approximating a laminar flow; and then clarifying the waste water by separating the full floc from the waste water. (Kreager-FIRL)
W77-00562

TANK CLARIFICATION PLANT,
Rice (F. B.) and Co., Balmain (Australia).
J. R. Kaelin.
Australian Patent 472,050. Issued May 13, 1976. Australian Official Journal of Patents, Trade Marks, and Designs, Vol. 46, No. 16, p 1546-1547, May 13, 1976.

Descriptors: *Patents, Flow, *Sewage treatment, *Waste water treatment, Equipment, *Design criteria, Water levels, Oxygenation, Separation techniques, Treatment facilities, Tanks.

A patent for a tank clarification plant designed for handling large-scale irregular sewage influx is described. The device consists of the following components: a tank; a liquid circulation member disposed adjacent the lower region of the tank and in the central area thereof; several impeller blades associated with the circulation member for causing liquid in the tank to circulate in a direction from above the impeller blades to the upper level of the liquid in the tank; at least one stationary cutting blade disposed immediately adjacent the liquid circulation member and having leading edges continuously cooperable with the impeller blades of the circulation member for producing a shearing effect therebetween; a conduit in the tank which is open at one end to the exterior of the tank and at the other end immediately above the liquid circulation member for the purpose of introducing oxygen or an oxygen-containing gas mixture into the immediate vicinity of the inlet side of the liquid circulation member; and a means for controlling the liquid level in the tank to insure that the liquid level is always above the liquid circulation member. (Kreager-FIRL)
W77-00563

SLUDGE ELEVATOR FOR FLUID CLARIFICATION SYSTEM,
Cincinnati Butchers Supply Co., Ohio. (Assignee).
F. A. Zaenkert.
United States Patent 3,966,617. Issued June 29, 1976. Official Gazette of the United States Patent Office, Vol. 947, No. 5, p 2252, June 1976. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Separation techniques, Equipment, *Design criteria, Liquid wastes, Waste treatment, Sludge.

A patent for a fluid clarification device designed to separate scum, sludge, and clear fluid from contaminated effluent is described. The device consists of the following components: a separator tank with a rotable shaft which extends axially for the entire height of the tank; an inlet pipe extending upwardly into the tank from the bottom thereof and having an effluent discharge opening for discharging contaminated effluent within the tank; a cylindrical housing disposed coaxially around the inlet; a circular splash plate located above the discharge opening and connected to the rotatable shaft; a circumferential channel defined by an outer side wall and an inner wall, with the bottom edge of the inner wall spaced upwardly from the bottom a distance greater than the maximum depth of sludge accumulation on the tank bottom so as to define a fluid discharge port for clean effluent; a skimmer means for sweeping floatable particles from the fluid surface; and a scraper blade for removing settled particles from the tank bottom. The circumferential edge of the splash plate defines several radially and downwardly directed ports for directing the flow of contaminated effluent impinging against the plate from the inlet discharge opening in an outward and downward direction into the tank at a level below the liquid surface. (Kreager-FIRL)
W77-00564

DOUBLE FUNNEL DEVICE FOR OXYGENATING SEWAGE,
Atara Corp., Montreal (Quebec). (Assignee).
J. W. Romanowski.
United States Patent 3,968,086. Issued July 6, 1976. Official Gazette of the United States Patent Office, Vol. 948, No. 1, p 261, July 1976. 1 fig.

Descriptors: *Patents, *Sewage treatment, *Oxygenation, Equipment, *Design criteria, *Waste water treatment, Liquid wastes.

A patent for a device designed to oxygenate liquid sewage is described. The device consists of the following components: a means for supplying a pressurized oxygen-containing gas which includes an orifice for issuing a continuous stream of gas upwardly from below the top surface of the liquid sewage; a means for securing a first funnel at a location downstream from the orifice, with the upstream opening of the first funnel comprising a first inlet for entraining liquid sewage; a second funnel extending downstream from the downstream opening of the first funnel; a means to secure the second funnel in a predetermined relationship to the first funnel, with the upstream opening of the second funnel comprising a second inlet for intraining liquid sewage; an exit tube extending both upstream and downstream from the downstream opening of the second funnel, with an upstream opening in the exit tube which comprises a third inlet for liquid sewage entrainment; and a means for securing the exit tube to the gas supplying means. (Kreager-FIRL)
W77-00565

METHOD OF TREATING WASTE WATER,
Exxon Research and Engineering Co., Linden, N. J. (Assignee).
A. W. Liles, and R. D. Schwartz.
United States Patent 3,968,036. Issued July 6, 1976. Official Gazette of the United States Patent Office, Vol. 948, No. 1, p 248-249, July, 1976. 1 fig.

Descriptors: *Patents, *Biological treatment, *Waste water treatment, *Activated sludge, *Catalysis, Industrial wastes, Municipal wastes, Byproducts, Carbon, Organic compounds, Oxidation, Nucleation, Oxides, Metals.

A patent for a process which biologically treats industrial and municipal waste water containing organic carbon is described which utilizes a catalyst which has been deactivated in a fluid cracking process. The method involves mixing the waste water with an activated sludge at conditions which promote the biological oxidation of a portion of the organic carbon present in the waste water. These conditions include operation at a temperature between 10 and 60C and the separation of the effluent from the mixture of waste water and activated sludge. The novel aspect of the process involves the mixing of a catalyst with the activated sludge. The catalyst is one which has been deactivated in a fluid cracking process and comprises vanadium, iron, nickel, copper, and carbon supported on an inorganic oxide of alumina, silica, aluminum silicates, or mixtures thereof. The ration of the inorganic oxide, which acts as a nucleation center in the process, to activated sludge is anywhere from 0.1 to 10 weight %. (Kreager-FIRL)
W77-00566

PROCESS AND APPARATUS FOR TREATING WASTES BY A COMBINED ACTIVATED SLUDGE AND BIOLOGICAL FILTER BED,
J. Tymoszczuk.
United States Patent 3,968,034. Issued July 6, 1976. Official Gazette of the United States Patent Office, Vol. 948, No. 1, p 248, July, 1976. 1 fig.

Descriptors: *Patents, *Biological treatment, *Activated sludge, *Filtration, *Waste water treatment, Aeration, Sewage treatment, Recycling, Design criteria, Equipment.
Identifiers: *Biological filter beds.

A patent for a biological process and apparatus designed to treat waste water and sewage is described. The process involves the following steps: maintaining a submerged aerated biological filter bed zone in which finely divided particulate filtering media circulate; maintaining an aerated activated sludge zone in an upstream fluid zone; feeding waste to the activated sludge zone; recycling the waste from the activated zone through the biological filter bed and back to the activated sludge zone; maintaining a biological stable filter bed zone in downstream fluid flow relationship to the aerated biological filter bed zone and activated sludge zone so that the waste passes thereto; draining the treated waste from the biological stable filter bed zone; and backwashing the biological stable filer bed zone as often as required to maintain the operating effectiveness of the filter and an acceptable headloss at the treated effluent withdrawal point. (Kreager-FIRL)
W77-00567

EMULSION POLYMERIZATION OF CATIONIC MONOMERS,
Calgon Corp., Pittsburgh, Pa. (Assignee).
J. E. Morgan, and J. E. Boothe.
United States Patent 3,968,037. Issued July 6, 1976. Official Gazette of the United States Patent Office, Vol. 948, No. 1, p 249, July, 1976.

Descriptors: *Patents, *Sludge treatment, *Dewatering, *Filtration, *Polymers, *Emulsions, Surfactants, Waste water treatment, Chemical reactions, Solubility.

A patent for a process that releases water from activated sewage sludge is described. The process involves the following steps: addition to the sludge of between 0.1 and 20 ppm of a cationic polymer which is prepared by forming an aqueous solution of between 5-95% by weight of dimethl diallyl ammonium chloride and between 0.005 and 5 mole% based on the moles of dimethyl diallyl ammonium chloride of a copolymerizable polyunsaturated cross-linking monomer selected from methylenebisacrylmide, methyl triallyl ammonium chloride, or tetraallyl ammonium chloride; preparation of a water-in-oil emulsion of the aqueous solution in a water insoluble liquid containing a surfactant, with the water insoluble liquid being between 25 and 90% by weight of the total emulsion and the surfactant being 0.5% to 10% by weight of the total emulsion; heating the emulsion to a temperature sufficient to polymerize the monomers in the presence of a free radical polymerization initiator, with the free radical initiator being present in amounts varying from 0.0000001 to 0.1 mole/mole of dimethyl diallyl ammonium chloride; and filtering the sludge-polymer mixtre. (Kreager-FIRL)
W77-00568

SEWAGE SYSTEM WITH REUSABLE FLUSH MEDIUM,
Chrysler Corp., Detroit, Mich. (Assignee).
R. W. Claunch, T. N. Deane, P. D. M. Rogan, C. M. Powe, and M. Werner.
United States Patent 3,974,528. Issued August 17, 1976. Official Gazette of the United States Patent Office, Vol. 949, No. 3, p 866, August, 1976. 1 fig.

Descriptors: *Patents, *Sewage treatment, *Separation techniques, *Design criteria, *Reclamation, Waste water treatment, Flow.
Identifiers: Flush mediums.

A patent for a system that separates sewage waste from a flush medium so that the medium can be reused is described. The system consists of the following components: a non-aqueous liquid flush medium with a specific gravity less than that of water; a separating tank for receiving and separating the sewage waste and flush medium; a flush medium outlet means positioned in the upper section of the separating tank; a first waste receiving tank connected to the lower waste containing section of the separating tank; and a waste outlet means positioned in the first waste receiving tank. The two outlet means insure that the retained volumes of waste are held at substantially constant levels in both tanks. An intermediate interface in the separating tank established between the floating flush medium and the waste remains at a constant level below the flush medium outlet even during the receipt of additional flush medium and sewage waste. (Kreager-FIRL)
W77-00569

APPARATUS FOR AEROBIC DECOMPOSITION OF SEWAGE,
R. E. Diggs.
United States Patent 3,966,604. Issued June 29, 1976. Official Gazette of the United States Patent Office, Vol. 947, No. 5, p 2247, June, 1976. 1fig.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Aerobic treatment, Flow, Aerobic conditions, Equipment, Bubbles, Waste treatment, Liquid wastes.
Identifiers: Aerobic decomposition.

A patent for an apparatus that achieves aerobic, sludge-free decomposition of sewage and waste water is described. The device consists of several separate liquid-containing compartments, a rotatable and horizontally disposed hollow drum at least partially immersed in the liquid contained in the first of the compartments, a raw sewage feed pipe with a discharge end located in the interior of the drum, and air inlet means at the bottom of the first compartment, a bubble trapping means connected with the drum, and a flow control means associated with the compartments to effect a sequential flow of material through all of the compartments and the recycling of heavier particles. Sewage introduced into the drum contacts an irregular inner surface of the drum sides for agitation. Drum rotation is sufficient to cause particle fragmentation and subsequent passage of smaller particles through holes in the drum sides. At least some of the bubbles produced by the air inlet means contact fragmented particls, resulting in agitation, aeration, and enhanced aerobic decomposition. (Kreager-FIRL)
W77-00570

TREATING POLLUTED WATER.
Australian Patent 471,335. Issued April 1976. Official Journal of Patents, Trade Marks and Designs, Vol 46, No 13, p 1238, April, 1976.

Descriptors: *Patents, *Waste water treatment, *Separation techniques, *Coagulation, *Absorption, Filtration, Bactericides, Suspended solids, Biochemical oxygen demand, Phosphorus, Waste treatment.

A patent for a process to treat polluted water such that a disposable mass of solids is produced along with an effluent with a relatively low biochemical oxygen demand, low suspended solids level, and low phosphorus content is described. The method involves establishing a mixture of the polluted water with four additives: a bactericidal agent, a colloidal solids coagulating agent, a filter aid, and an absorbent. The aqueous medium has a solids particle size resulting from recirculation between a polluted water accumulation zone and a zone adapted to effect coarse disintegration of any solids exceeding a predetermined particle size. The mixture of polluted water and additives is passed through a liquid and airtight liquid flow system under conditions to effect an intimate mixing of the additives and to maintain the solids in suspension. The liquid portion of the suspension is then separated from the solids for discharge as a substantially solids-free effluent. (Kreager-FIRL)
W77-00571

TREATMENT OF SEWAGE.
Australian Patent 472,563. Issued May 27, 1976. Official Journal of Patents, Trade Marks and Designs, Vol. 46, No. 18, p 1749, May, 1976.

Descriptors: *Patents, *Sewage treatment, *Separation techniques, *Disinfection, *Color, Chemical reactions, Recycling, Waste water treatment, Physical properties, Chemical properties.
Identifiers: Deodorization, Decolorization.

A patent for a method of treating sewage is described. The method involves the following steps: flushing the sewage with a flushing liquid from serveral receivers to form a mixture of liquid and sewage; separating the mixture into a portion containing a high level of solids and another portion containing a high level of liquid; separating the solid matter from the liquid with a high liquid content; maintaining a chemical composition in the liquid such that it acts as a disinfectant and deodorant; maintaining a bleaching action in the liquid to achieve a decolorizing effect; using the liquid as flushing liquid for the step; subjecting the high solids portion of the waste to mechanical particle size reduction; and holding the high solids portion of the waste in storage so that substantially all of the solid matter is exposed to the chemical content of the liquid and is thereby broken down, dispersed, sterilized, and deodorized. (Kreager-FIRL)
W77-00572

DECANTING WASTE WATER.
Australian Patent 472,574. Issued May 1976. Official Journal of Patents, Trade Marks and Designs, Vol 46, No 18, p 1752, May, 1976.

Descriptors: *Patents, *Waste water treatment, Flow characteristics, *Separation techniques, Sludge treatment, Currents(Water), Waste treatment, Liquid wastes, Biological treatment.

A patent for a method of treating waste water and any flocculating agents which may be required is described which involves passing the liquid upwardly over a sludge bed. The liquid is introduced periodically through and across the surface of the base of the sludge bed, with the treatment time being very short relative to the pauses which follow them. The liquid is removed from the above sludge bed after treatment. The method offers improved settling characteristics over prior art methods by directing the liquid through a preferential current imparting means in a direction of flow inclined to the horizontal. The preferential current imparting means extends upwardly in the sludge bed from its base surface, thereby resulting in enhanced sludge settling in the bed and the generation of preferential currents in the liquid and sludge. (Kreager-FIRL)
W77-00573

METHOD OF WASTEWATER TREATMENT,
Autotrol Corp., Milwaukee, Wis. (Assignee).
W. N. Torpey.
United States Patent 3,976,568. Issued August 24, 1976. Official Gazette of the United States Patent Office, Vol. 949. No. 4, p 1555, August, 1976. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Hydrogen sulfide, *Biological treatment, *Separation techniques, Organic compounds, Digestion, Waste treatment.

A patent for a method of treating waste water containing settleable organic solids and solublilized carbonaceous pollutants is described. Th method consists of the following steps: supplying the waste water to a treatment tank having upper and lower zones, settling the organic solids from the waste water in the upper zone, accumulating the settled solids in the lower zone, anerobically digesting the settled organic solids in the lower zone, and maintaining the waste water in the upper zone for a predetermined detention to produce a waste water effluent that is virtually free of dissolved or entrained hydrogen sulfide. (Kreager-FIRL)
W77-00574

PHOSPHORUS REMOVAL FROM WASTE WATER.
Australian Patent 473,137. Issued June 17, 1976. Official Journal of Patents, Trade Marks and Designs, Vol. 46, No. 21, p 2029-2030, June, 1976.

Descriptors: *Patents, *Waste water treatment, *Biological treatment, *Aeration, *Phosphorus compounds, Sludge, Chemical precipitation, Recycling, Oxygenation.
Identifiers: *Phosporus removal.

A patent for a method designed to treat waste water containing biodegradable carbonaceous pollutants and phosphorus compounds is described. The method involves the following steps: introducing the waste water into a first aeration zone where it is mixed with a carbon-food consuming sludge and a phosporus-precipitating compound while being broutht into intimate contact with an oxygenating feed gas; recycling the sludge settled from the effluent liquor to the first aeration zone; passing the solids-sepleted liqid effluent into a second aeration zone where it is mixed with a carbonfood consuming sludge while being brought into intimate contact with a second oxygenating gas; and discharging the solids-depleted liqid effluent from the second aeration zone as product effluent water. The carbon-food consuming sludge in the second aeration zone consists at least in part of recycled sludge settled from the effluent liquor of the second aeration zone. (Kreager-FIRL)
W77-00575

METHOD FOR IMPROVING SEWAGE SLUDGE INCINERATION,
Nalco Chemical Co. Oak Brook, Ill. (Assignee).
For primary bibliographic entry see Field 5E.
W77-00576

APPARATUS FOR TREATMENT OF AQUEOUS SEWAGE COMPOSITION,
Heds, Inc., Chagrin Falls, Ohio. (Assignee).
T. C. Johnson, and J. D. Snodgrass.
United States Patent 3,975,256. Issued August 17, 1976. Official Gazette of the United States Patent Office, Vol. 949, No. 3, p 1105, August 1976. 1 fig.

Descriptors: *Patents, *Sewage treatment, *Separation techniques, *Electrodes, Design criteria, Electrical equipment, *Waste water treatment, Electric currents, Equipment.

A patent for an apparatus capable of treating aqueous sewage without mechanical manipulation is described. The device consists of the following components: an enclosed chamber for receiving the aqueous sewage composition in its lower portion, thus defining an ullage space in its upper portion; a gas-tight valved inlet for the aqueous sewage which opens into the top of the ullage space; at least two electrodes of unlike polarity extending into a treatment space at the lower sewage-receiving portion of the chamber below the ullage space; a means for imposing on the electrodes a potential difference which is sufficient to effect an electrolytic discharge of gas at at least one of the electrodes as well as a current across the electrodes which is sufficient to cause an ebul-

lient rolling action which in turn causes the generation of a solids-containing head of lesser density above the aqueous sewage composition; and an outlet from the top of the ullage space which is connected through a conduit to a discharge end and allows for the outward passage of the solids-containing head. (Kreager-FIRL)
W77-00577

TREATING SEWAGE AND RECOVERING USABLE WATER AND SOLIDS,
B. J. Stralser.
United States Patent 3,975,247. Issued August 17, 1976. Official Gazette of the United States Patent Office, Vol. 949, No. 3, p 1102-1103, August 1976. 1 fig.

Descriptors: *Patents, *Sewage treatment, *Separation techniques, Electrical equipment, *Reclamation, Electrodes, Design criteria, Chlorides, *Waste water treatment, Electric currents, Bacteria, Suspended solids.

A patent for a process and apparatus that treats sewage and recovers usable water and solids which are substantially free of live bacteria is described. The method involves the following steps: diluting the sewage with water to greater than 20 parts of water to one part solids (by weight); macerating the diluted material; passing the diluted macerated sewage upwardly through a screen thereby separating the non-suspended solids from the liquid; adjusting the chloride salt content of the sewage to between a minimum of 0.05% and a maximum of 3.5% (by weight); passing the screened sewage in a serpentine path progressively between a series of parallel electrodes; removing the evolved gases as the sewage progressively passes between the electrodes; and separating the liquid and suspended solids after the sewage passes between the electrodes. The electrical current flow between adjacent electrodes and through the sewage is between 0.25 and 1.0 amperes/sq in of electrode surface. (Kreager-FIRL)
W77-00578

HIGHLY ENERGY EFFICIENT-WILTON WASTEWATER TREATMENT PLANT,
D. A. Wilke, and D. R. Fuller.
Civil Engineering-ASCE, Vol. 46, No. 5, p 70-72, May 1976. 3 fig.

Descriptors: *Waste water treatment, *Treatment facilities, *Energy conversion, Economics, Gravity, Solar radiation, Construction, Materials, Concrete construction, Dewatering, Biological treatment, Disinfection, Stabilization, Design.

A highly efficient waste water treatment plant design that minimizes the need for offsite energy requirements is described. The design takes advantage of gravity flow to reduce pumping needs, solar energy to provide heat for the anaerobic digesters, and concrete construction to retain heat for the building itself. Waste water is lifted into the plant by screw pumps which use less energy than conventional pumps and flows through the rest of the plant by gravity. Pretreatment is provided by comminution and grit removal. Gross solids are removed by rotary screens. Secondary biological treatment is accomplished via a rotating biological contactor. Final solids separation is accomplished in clarifiers from which the solids are combined with the primary screenings and pumped to anaerobic digesters for stabilization before dewatering and disposal. Disinfectant for the effluent is generated on-site electrochemically from salt and water. First year energy cost savings are estimated to be $4700. (Kreager-FIRL)
W77-00579

INTERACTIONS BETWEEN SLUDGE CONDITIONING, VACUUM FILTRATION, AND INCINERATION,
Minnesota Univ., Mineapolis. Dept. of Civil and Mineral Engineering.
G. L. Christensen, W. R. Elliott, and W. K. Johnson.
Journal Water Pollution Control Federation, Vol. 48, No. 8, p 1955-1969, August 1976. 15 fig, 3 tab, 26 ref.

Descriptors: *Sludge treatment, *Chemical reactions, *Dewatering, *Filtration, *Incineration, Waste treatment, Analytical techniques, Lime, Iron compounds, Chlorides.
Identifiers: Ferric chloride, *Vacuum filtration.

Laboratory investigations of chemical sludge conditioning, vacuum filtration, and filter cake incineration were conducted. Neither lime nor ferric chloride alone was capable of producing a conditioned sludge suitable for vacuum filtration, even at doses as high as 30% on a dry solids basis. The most effective combination for chemical conditioning was 5% ferric chloride and 15% lime. Specific resistance measurements of sludge dewaterability exhibited considerable scatter, while capillary suction time measurements were quite precise. Nevertheless, specific resistance measurements reflected the improved sludge solids leaf yields associated with increases in ferric chloride and lime doses, whereas capillary suction time measurements did not. The water to sludge solids ratio was the utmost importance in assessing auxiliary fuel requirements for filter cake incineration. (Kreager-FIRL)
W77-00580

EVALUATION OF A SULFUR-THIOBACILLUS DENITRIFICANS NITRATE REMOVAL SYSTEM,
Agricultural Research Service, Beltsville, Md.
L. J. Sikora, and D. R. Keeney.
Journal of Environmental Quality, Vol. 5, No. 3, p 298-303, July-September, 1976. 6 fig, 3 tab, 32 ref.

Descriptors: *Denitrification, *Septic tanks, *Sewage treatment, *Domestic wastes, *Nitrates, *Biological treatment, Bacteria, Sulfates, Groundwater, Sulfur, Carbon, Inorganic compounds, Organic compounds, *Waste water treatment, Kinetics, Chemical reactions.
Identifiers: *Thiobacillus denitrificans.

A sulfur-Thiobacillus denitrificans nitrate removal system was evaluated as a means of denitrifying nitrified septic tank effluent. Duplicate 10 by 64 cm columns were filled with a 1/1 mixture (by weight) of elemental sulfur and dolomite chips and were pretreated by recycling an enrichment culture of Thiobacillus denitrificans ATCC 23642 through the columns for 3 days. Continuous passage of the nitrified septic tank effluent containing 40 micrograms of nitrate/milliliter through the columns resulted in nearly complete nitrate removal in 3.3 hours at steady state conditions. The denitrification kinetics appeared to be first order in the range of nitrate concentrations used. Sulfate was the major sulfur end product and was present at relatively high concentrations (90 micrograms/milliliter). Passage of column effluent through 10 by 60 cm Plainfield sand columns did not significantly decrease sulfate levels. A significant decrease in inorganic carbon content occurred with depth in the columns, but changes in organic carbon were insignificant. Although the use of this nitrate removal system appears promising, sulfate contamination of the groundwater may limit its applicability. (Kreager-FIRL)
W77-00581

RELATION OF OPERATION AND MAINTENANCE TO TREATMENT PLANT EFFICIENCY,
Environmental Protection Agency, Washington, D.C. Municipal Operations Branch.
W. G. Gilbert.
Journal Water Pollution Control Federation, Vol. 48, No. 7, p 1822-1833, July, 1976. 5 fig, 9 tab, 20 ref.

Descriptors: *Treatment facilities, *Waste water treatment, *Operation and Maintenance, *Efficiencies, *Operations, Federal government, Surveys, Municipal wastes, Programs, Economics, Quality control.

Information from Environmental Protection Agency annual surveys on the efficiency of federally funded waste water treatment facilities is presented. A major finding of the survey effort is that about one-third of the nation's municipal treatment facilities constructed with federal grant assistance are not operating at their designed efficiency levels. The causes are many and varied and depend on factors related to each specific treatment facility. Areas where increased emphasis is necessary to assist in improving the efficiency and reliability of treatment facility performance include: the strengthening of municipal operations programs at the local, state, and federal levels; the development of expanded capabilities to provide technical operational assistance to municipal facilities; the identification and satisfaction of treatment facility operator needs; the improvement of laboratory capabilities and testing programs to provide better process control information; the provision of an adequate operating budget at the local level; and the development of simplified and effective process control strategies and methodologies. (Kreager-FIRL)
W77-00582

EFFECTS OF LIME ADDITION ON TREATMENT PLANT OPERATION,
URS Co., Seattle, Wash. Studies and Planning.
G. R. Minton, and D. A. Carlson.
Journal Water Pollution Control Federation, Vol. 48, No. 7, p 1697-1727, July, 1976. 12 fig, 13 tab, 60 ref.

Descriptors: *Lime, *Waste water treatment, *Additives, *Influent streams, *Effluent streams, Biological treatment, Chemical properties, Physical properties, Suspended solids, Oxygen demand, Sludge, Solid wastes, *Treatment facilities, Operations.
Identifiers: Clarifiers.

The effect of using lime as a clarifying chemical on the total operation of a waste water treatment facility is discussed. Lime addition to the raw waste water can be expected to result in a decrease in suspended solids and oxygen demand in the primary effluent. A relatively clear effluent can be produced at insolubilization pH's of 9.5, 10, 10-11, and 11-11.5 in waste waters of high, moderate, and low hardness and alkalinity, respectively. A coagulant aid will be required for low hardness-low alkalinity waste waters and probably also for a waste water with moderate hardness and alkalinity. The settling rate of the floc will increase, benefiting hydraulically overloaded clarifiers. Modification of the primary effluent will also affect the biological process. Lower organic loadings will occur, benefiting an organically overloaded process; however, it is possible that too low an organic loading will result in a deterioration of the final effluent. Both the quantity and quality of solids and sludge will be significantly altered by lime addition. If the system is operated within the pH ranges identified above, solids will increase by a factor of two to three. The quantity of sludge may not increase correspondingly because of an increase in the solids concentration. (Kreager-FIRL)
W77-00583

THE PERFORMANCE-POTENTIAL OF POLYELECTROLYTES AND HIGH VELOCITY GRADIENTS IN THE TREATMENT OF WASTEWATERS,
Ife Univ.(Nigeria). Dept. of Agricultural Engineering.

O. Ogedengbe.
Effluent and Water Treatment Journal, Vol. 16, No. 6, p 289-292, June, 1976. 2 fig, 2 tab, 5 ref.

Descriptors: *Sewage treatment, *Polyelectrolytes, *Coagulation, Sedimentation, *Sedimentation rates, Biochemical oxygen demand, Suspended solids, Turbidity, *Waste water treatment, Treatment facilities, Feasibility studies, *Performance.
Identifiers: Primary sedimentation.

The performance of polyelectrolytes in the coagulation of sewage under varying conditions of velocity gradients was investigated to assess the feasibility of using such materials to obtain higher removals of suspended solids and biochemical oxygen demand in primary sedimentation tanks. High velocity gradients were found desirable up to about 500/sec when a domestic waste water was treated with cationic polyelectrolytes. An extended period of rapid mixing was also found desirable up to about 25 minutes. Turbidity removal was improved when bentonite clay or aluminum sulfate was used as a coagulant aid along with the polyelectrolyte. The results indicated that the management of existing domestic waste water treatment plants can be improved by the use of high velocity gradients, an extended period of shear, and the addition of polyelectrolytes with some form of coagulant aid to the primary treatment units. The total length of time required (30 minutes of rapid and slow mixing plus 20 minutes of quiescent settling) is considerably less than the conventional detention time of about 2 hours commonly used in primary sedimentation. (Kreager-FIRL)
W77-00584

FOR NITRIFICATION - ONE SLUDGE OR TWO,
Brown (P. E.) and Devlin Associates, Seneca, N. Y.
C. G. Brown.
American City and County, Vol. 91, No. 7, p 49-50, July, 1976. 1 tab.

Descriptors: *Nitrification, *Activated sludge, *Pilot plants, *Efficiencies, *Nitrogen fixation, Nitrogen fixing bacteria, *Waste water treatment, Performance, Evaluation, Temperature, Design criteria, Treatment facilities.

A pilot plant study comparing parallel systems of carbon oxidation and nitrification versus combined nitrification revealed no apparent differences in the efficiency and performance of one- and two-sludge nitrifying systems operated under the same growth conditions at the same temperature. The pilot study was conducted at two temperatures: 8 C and 20 C. The maximum growth rates of nitrifying bacteria at these two temperatures were determined to be 0.25 days and 0.5 days, respectively. Essentially complete nitrification was attained at both temperatures at biological solids retention times of 20 days and 10 days, respectively. The results of the study indicated that nitrification in the activated sludge process can be effectively controlled by application of the concept of biological solids retention time and appropriately determined sludge wasting policies. The results also indicated that the nitrification process should be selected on the basis of economic and operating criteria rather than on process performance. (Kreager-FIRL)
W77-00585

AUTOMATION IN SEWAGE PROCESSING,
Siemens A.G., Karlsruhe(West Germany). Measurement and Process Engineering Div.
E. Michel.
Siemens Review, Vol. 43, No. 5, p 184-190, May, 1976. 9 fig, 9 ref.

Descriptors: *Treatment facilities, *Automation, *Monitoring, *Automatic control, *Sewage treatment, Chemical oxygen demand, Computers, Analytical techniques, Photometry, Design criteria, Equipment.

Automated instrumentation for the monitoring and control of sewage plant operations is discussed, with particular reference to a chemical oxygen demand measuring system and closed-loop control. The chemical oxygen demand measuring system requires an analysis time of about 25 minutes and can operate for 8-10 days without maintenance. Analysis takes place in a double-beam photometer with a reference beam of 750 nanometers and a measuring beam of 440 nanometers. The measuring ranges are: 0-100, 0-500, and 0-1000 milligrams of chemical oxygen demand/liter. A closed-loop control system is illustrated in which the oxygen supply is controlled by a reference variable expressing the amount of oxygen required for decomposition of the organic matter in aeration tanks. A photoelectric program transmitter can be connected to provide a reference variable expressing the daily oxygen load curves as empirical values. Advantages offered by the use of process computers in the control of sewage plant operations are also discussed. (Kreager-FIRL)
W77-00586

UTILIZATION OF ALUMIZED RED MUD SOLIDS FOR PHOSPHORUS REMOVAL,
Black, Crow and Eidsness, Inc., Gainesville, Fla. Process Design Dept.
E. E. Shannon, and K. I. Verghese.
Journal Water Pollution Control Federation, Vol. 48, No. 8, p 1948-1954, August, 1976. 3 fig, 4 tab, 6 ref.

Descriptors: *Water treatment, *Phosphorus, *Coagulation, *Pilot plants, *Feasibility studies, Costs, Biochemical oxygen demand, Suspended solids, Evaluation, Performance, Byproducts, Chemical precipitation, *Waste water treatment.
Identifiers: Alumized red mud.

The feasibility of using alumized red mud solids to precipitate phosphorus from water was investigated. Alumized red mud solids are the product obtained when red mud (a waste material formed during the production of alumina) is slurried with sulfuric acid followed by heat drying and crushing of the resulting solid product. Preliminary pilot plant studies revealed that the use of alumized red mud solids as a coagulant in fullscale phosphorus removal facilities is technically feasible. Practical dosage levels required to achieve a 1-milligram/liter total phosphorus level were around 200 milligrams/liter. Full-scale demonstration studies are planned to confirm the pilot plant results. Chemical cost savings on the order of 35% over traditional phosphorus removal systems are anticipated. Raw waste water biochemical oxygen demand and suspended solids removals obtained by the use of the alumized red mud solids at a dose of 200 milligrams/liter were comparable with removals obtained by alum at 200 milligram/liter and superior to those obtained by lime at 250 milligrams/liter. (Kreager-FIRL)
W77-00587

SODIUM ALUMINATE IMPROVES SLUDGE PROPERTIES,
Greene County Wastewater Treatment Plant, Ohio.
C. F. Lenhart.
American City and County, Vol. 91, No. 8, p 36-37, August, 1976.

Descriptors: *Waste water treatment, *Activated sludge, *Additives, *Physical properties, *Chemical properties, On-site investigations, Sludge digestion, Phosphorus, Biochemical oxygen demand, Suspended solids.
Identifiers: Sodium aluminate, Alum.

The use of sodium aluminate to improve sludge properties was evaluated during a 43-week study at an activated sludge waste water treatment plant. During the study, liquid sodium aluminate was added at a rate sufficient to produce a concentration of 10 milligrams/liter (as aluminum) in the sewage as it entered the aeration tanks. Three 4-week addition periods were separated by equal periods with no alum addition. The median sludge volume index during the aluminate treatment was 86 as compared with 146 during the non-treatment periods. Aluminate addition also resulted in increased floc density which kept the secondary clarifier sludge blanket in place, preventing washouts even during periods of severe hydraulic overload. The denser floc also proved helpful in sludge digestion. It became easy to form a separable supernatant that was low in biochemical oxygen demand and suspended solids and that could easily be withdrawn from the aerobic digestion tanks. Phosphorus removal during the treatment periods averaged 80% as compared with a normal 42% removal without aluminate. Residual benefits in the process continued for 10 days after aluminate feed was discontinued. Improvement was observed within 24 hours following the initiation of aluminate addition. (Kreager-FIRL)
W77-00588

SOFT WATER CAN MEAN HARD DISPOSAL PROBLEMS,
Williams (Clyde E.) and Associates, Inc., South Bend, Ind.
For primary bibliographic entry see Field 5E.
W77-00589

SINGLE-STAGE NITRIFICATION-DENITRIFICATION,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
D. F. Bishop, J. A. Heidman, and J. B. Stamberg.
Journal Water Pollution Control Federation, Vol. 48, No. 3, p 520-532, March, 1976. 5 fig, 8 tab, 15 ref.

Descriptors: *Nitrification, *Denitrification, *Activated sludge, *Waste water treatment, *Pilot plants, Biological treatment, Nitrogen, Dissolved oxygen, Design criteria, Efficiencies, Treatment facilities, Performance, Evaluation.
Identifiers: Bulking.

The removal of 75-84% of nitrogen from primary waste water has been achieved recently in a single-stage activated sludge (30,000-50,000 gallons/day) pilot plant without the use of supplemental organic carbon. The removal was achieved in a two-pass biological reactor in which the dissolved oxygen concentration was varied from 0 to 3 milligrams/liter. Air from a blower was applied on a 30-minute cycle, first to one reactor pass and then to the other. Mechanical mixers suspended the mixed liquor solids when the air was not applied to the pass. Nitrification occurred readily when the dissolved oxygen concentration was equal to or greater than 2 milligrams/liter; when the dissolved oxygen level was decreased to near zero, denitrification occurred. The chemical oxygen demand to total Kjeldahl nitrogen ratio in the waste water entering the reactor controlled the amount of nitrogen removal. A nitrogen removal of 84% was achieved in the summer at a ratio of 10:1; and during the winter, 75% of the total nitrogen based on the primary effluent was removed. Bulking problems limited winter operations and required low overflow rates (300 gallons/day/sq ft) to capture the solids in the clarifier. (Kreager-FIRL)
W77-00590

CARBON ADSORPTION OF AIR AND WATER POLLUTANTS,
For primary bibliographic entry see Field 5F.
W77-00591

DON'T WASTE WATERWEEDS,
National Space Technology Labs., Bay St. Louis, Miss.
B. Wolverton, and R. C. McDonald.
New Scientist, Vol 71, No 1013, p 318-320, August 12, 1976. 1 fig, 3 tab.

Descriptors: *Water hyacinth, *Waste water treatment, *Nutrients, *Heavy metals, *Organic compounds, Sewage treatment, *Biological treatment, Treatment facilities, Domestic wastes, Chemical wastes, Fertilizers, Byproducts, Methane, Mississippi, Lagoons.

Experiments conducted by the National Aeronautics and Space Administration indicate that water hyacinths (Eichhornia crasspipes) have the ability to absorb organics, heavy metals, nutrients, and other chemical elements from waste water under tropical and subtropical conditions while producing a large quantity of plant material. This water hyacinth biomass, when grown in sewage free of toxic metals, is a potential source of protein fertilizer, methane gas, and other valuable products. Currently, a water hyacinth chemical waste filtration system consisting of a zig-zag canal 330 meters long, 6.4 meters wide, and 0.8 meters deep is treating 95,000 liters/day of chemical and photo lab waste. On the basis of an analysis of raw sewage from small communities in South Mississippi, a half hectare lagoon covered with water hyacinths with a minimum sewage retention time of 2 weeks is estimated to be capable of purifying the daily wastes of 1000 people. An experimental water hyacinth lagoon has already reduced pollutant levels by 75-80%. (Kreager-FIRL)
W77-00592

ADVANCED TREATMENT AND PLANNED DEVELOPMENT CONTROL COUNTY'S POLLUTION,
K. Hotz.
Water and Sewage Works, Vol 123, No 8, p 74-76, August, 1976. 3 fig.

Descriptors: *Sewage treatment, *Sewerage, *Treatment facilities, *Biological treatment, Physical control, Adsorption, Activated carbon, Oxidation, Activated sludge, Regional development, Projects, *Tertiary treatment, Planning, Ohio.
Identifiers: Biophysical treatment, Medina County(Ohio).

Plans for a regional sewage collection and treatment system which include a biophysical waste water treatment facility using powdered activated carbon and wet air regeneration are described. The facility will be one of the first permanent applications of such a system in the United States. A development plan is also to be established so that population growth will be promoted where facilities already exist, thus avoiding random growth and making waste water treatment the determining factor in future residential and industrial development. The treatment facility will combine the physical adsorption and biological oxidation phases into a single treatment step, and the system will be incorporated within an existing single stage activated sludge system. The biophysical approach will make it possible for the treatment system to withstand shock loads which often limit the effectiveness of ordinary biological treatment methods. The need for costly disposal of excess activated sludge is eliminated because in the process of regenerating carbon by wet oxidation the accumulated biomass is destroyed. (Kreager-FIRL)
W77-00593

WASTE-TREATMENT PLANT POWERED BY ON-SITE ENERGY,
V. E. Smay.
Popular Science, Vol 209, No 3, p 97, 164, September, 1976. 1 fig.

Descriptors: *Treatment facilities, *Waste water treatment, *Solar radiation, *Methane, *Design criteria, *Energy conversion, Heat transfer, Construction, Concrete structures, Materials.

A waste treatment plant design for reducing off-site energy requirements is described. Except for a period from mid-December through February, solar energy and methane are expected to produce more than 90% of the heat required for the plant. A 1500-square-foot flat-plate, glass-covered hydronic solar collector will be the primary source of solar heat. This heat will go mainly to the anaerobic sludge digesters which operate most efficiently at 95 F. Excess solar heat will be used for space heating and domestic hot water. Methane which will be obtained from the sludge digesters as a byproduct will serve as a long-term storage medium for the solar energy. The plant will also recover 75% of the heat from the exhaust air in the vent system and all the heat from the electric (methane-fueled) generator. The building structure will be constructed of concrete blocks and bricks with insulation between. The roof is designed to retain snow for insulation value. Snow will also be used as a solar reflector. The project is due for completion by late 1977. (Kreager-FIRL)
W77-00594

DISINFECTION KINETICS OF ALGAL-BACTERIAL SYSTEMS,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
C. Venkobachar, I. C. Devkota, and D. S. Rana.
Indian Journal of Environmental Health, Vol 18, No 1, p 26-32, 1976. 3 fig, 2 tab, 10 ref.

Descriptors: *Disinfection, *Chlorine, *Oxidation lagoons, *Kinetics, *Coliforms, Bacteria, Algae, Organic compounds, *Waste water treatment, Laboratory investigations.

Laboratory investigations on the disinfection kinetics of algal-bacterial systems were conducted to investigate the feasibility of using oxidation pond effluents for the irrigation of edible crops. Residual chlorine curves indicated that chlorine consumption is a complex process in algal-bacterial systems and appears to be due to the oxidation of complex organic components, dead bacteria, and algal cells. Kinetic data indicated a deviation from Chick's Law, with the rate of disinfection being a function of the time of contact, disinfectant concentration, number of organisms exposed, and the temperature of the medium. The kinetics of chlorination did not follow a first order reaction. The maximum dose of chlorine employed (25 mg/liter) reduced the coliform count to 100/100 milliliters within 10-15 minutes. (Kreager-FIRL)
W77-00595

SIMPLE METHOD MEASURES SUSPENDED SOLIDS,
American Enka Co., Clemson, S.C.
For primary bibliographic entry see Field 5A.
W77-00596

EVALUATING POLLUTION-PRONE STRATA BENEATH SEWAGE LAGOONS,
B. Leisch.
Public Works, Vol. 107, No. 8, p 70-71, August, 1976. 2 fig.

Descriptors: *Sewage lagoons, *Lagoons, *Stratigraphy, *Sewage treatment, Hydrogeology, *Geologic mapping, *Groundwater, Seismic studies, Resistivity, Analytical techniques, *Waste water treatment.

The use of electrical resistivity and seismic techniques for evaluating pollution-prone strata beneath lagoons is discussed. Refraction seismic studies can determine the physical characteristics and thickness of the underlying geologic formations. Earth resistivity measurements can then be used to develop greater detail in terms of porosity and permeability of consolidated or unconsolidated formations. An example illustrating the application of the above techniques for evaluating a sewage lagoon site is presented. An analysis of the data obtained from seismic and resistivity measurements indicated that voids in sandstone or underlying dolomite had developed initially through the action of descending groundwater along joints and fissures. The study also revealed the need for upgrading lagoon seal specifications. (Kreager-FIRL)
W77-00599

CADMIUM ACCRUAL IN COMBINED WASTE-WATER TREATMENT-AQUACULTURE SYSTEM,
Environmental Management Inst. Marion, Mass.
W. B. Kerfoot, and S. A. Jacobs.
Environmental Science and Technology, Vol. 10, No. 7, p 662-667, July, 1976. 8 fig, 2 tab, 22 ref.

Descriptors: *Aquiculture, *Sewage treatment, *Tertiary treatment, *Cadmium, *Algae, *Shellfish, Heavy metals, Toxicity, Phytoplankton, Sea water, *Waste water treatment, Liquid wastes, Metals.

Trace amounts of cadmium were added to isolated links of a sewage/seawater-plankton-shellfish food chain employed in a prototype tertiary treatment-aquaculture system. Accumulation of the metal was studied in two types of phytoplankton, a green platymonad (Prasinocladus tricornutum) and a mixture of diatoms (predominantly Phaeodactylum tricornutum and Chaetoceros simplex), as well as in two species of shellfish, the American oyster (Crassostrea virginica) and the hard clam (Mercenaria mercenaria). The algae showed a rapid increase in metal concentration until an equilibrium was reached proportional to the initial concentration introduced. Shellfish species exhibited a continual increase in concentration when exposed to sea water and algae mixtures contaminated with cadmium. Separation of the two pathways of transfer identified the algae as the principal source of accumulation in the aquaculture system. A rate of cadmium increase amounting to 0.003 micrograms/day was computed to be sufficient to yield a critical concentration of the metal for 3-year-old shellfish. (Kreager-FIRL)
W77-00600

DESTRUCTION OF ALKALINITY IN AEROBIC BIOLOGICAL WASTEWATER TREATMENT,
Virginia Polytechnic Inst. and State Univ. Blacksburg, Dept. of Civil Engineering.
J. H. Sherrard.
Journal Water Pollution Control Federation, Vol. 48, No. 7, p 1834-1839, July, 1976. 1 fig, 5 tab, 5 ref.

Descriptors: *Nitrification, *Activated sludge, *Alkalinity, *Waste water treatment, *Mathematical models, Ammonia, Nitrogen, Nitrates, Nitrogen fixing bacteria, *Biological treatment, Biochemical oxygen demand, Phosphorus, Growth rates, Calcium carbonate, Chemical reactions, Aerobic treatment.

A mathematical model is used in conjunction with biochemical stoichiometric equations to describe alkalinity destruction which occurs in nitrifying activated sludge waste water treatment systems. The model results reveal that the commonly accepted value of 7.14 pounds of alkalinity as calcium carbonate destroyed/pound of ammonia-nitrogen oxidized is in error. The error is primarily due to the incorporation of ammonia-nitrogen into the heterotrophic biomass. As a result, a smaller quantity of ammonia-nitrogen is available to be oxidized to nitrate-nitrogen. Primary factors affecting alkalinity destruction in nitrifying activated sludge systems are the influent waste water biochemical oxygen demand:nitrogen:phosphorus ratio and the net microorganism specific growth

rate. An example problem is presented to illustrate the importance of these two factors in calculating alkalinity destruction. (Kreager-FIRL)
W77-00606

REVERSE OSMOSIS AS AN ADVANCED TREATMENT PROCESS,
Ontario Ministry of the Environment, Thunder Bay.
H. S. Lim, and H. K. Johnston.
Journal Water Pollution Control Federation, Vol. 48, No. 7, p 1804-1821, July, 1976. 8 fig, 8 tab, 5 ref.

Descriptors: *Reverse osmosis, *Tertiary treatment, *Waste water treatment, *Nutrients, *Additives, Pilot plants, Efficiencies, Phosphates, Ammonia, Nitrates, Nitrites, Aluminum, Iron, Sulfates, Calcium, Chlorides, Membranes, Fouling.

Bench-scale and pilot plant studies of the effectiveness of reverse osmosis in removing nutrients and residual chemical additives from waste water were conducted. Reverse osmosis proved capable of removing nutrients from raw waste water, secondary waste water and non-waste water. Phosphate removals approaching 100% were attained. Ammonia removals averaged 85% and nitrate and nitrite rejections of approximately 56% were observed. Chemical additives conventionally used as phosphorus precipitating agents were almost completely removed. Aluminum, iron, and sulfate ion removals were above 97%; and calcium and chloride removals were 92% and 83%, respectively. During 4 months of operation, the removal efficiencies of all solutes studied remained almost constant. Variability in operating conditions exerted little effect on membrane selectivity, although permeate flux varied considerably. Surface fouling was most pronounced for membranes that exhibited lower rejection abilities. (Kreager-FIRL)
W77-00607

DENITRIFICATION OF WASTEWATER EFFLUENTS WITH METHANE,
Illinois State Water Survey Urbana.
F. W. Sollo, H. F. Mueller, and T. E. Larson.
Journal Water Pollution Control Federation, Vol. 48, No. 7, p 1840-1842, July, 1976.

Descriptors: *Denitrification, *Methane, *Waste water treatment, *Feasibility studies, *Kinetics, Biological treatment, Performance, Evaluation, Chemical reactions, Waste treatment, Bacteria, Nitrates, Reduction(Chemical), Economics.

The feasibility of using methane as a carbon source for denitrifying waste water effluents was investigated. Columns packed with 0.32 to 1.27-centimeter gravel were used as the reactors in most of the experiments. The liquid level was maintained at approximately one-half of the column height, and methane was added to the upper portion. The medium was recirculated downflow so that the liquid was able to dissolve methane from the atmosphere in the upper section before entering the lower flooded half of the column. Identical systems with methanol as the reducing agent were operated with nitrogen as the gas phase. Tests with parallel operations indicated that the rate of nitrate reduction with methane as the carbon source did not approach that observed with methanol. With methane, the maximum rate obtained was about 0.70 milligrams/hour/liter (as nitrogen); whereas with methanol as the carbon source, a rate of 4.6 milligrams/hour/liter (as nitrogen) was obtained. Efforts to increase the rate of nitrate reduction with methane using expanded columns failed, though such columns did increase the nitrate reduction rate when methanol was used as the carbon source. In view of the low nitrate reduction rate and problems involved in supplying dissolved methane to the denitrifying bacteria, denitrification with methane does not appear to be economical. (Kreager-FIRL)
W77-00609

WASTEWATER RECYCLING ALONG TRANSPORTATION CORRIDORS,
Black, Crow and Eidsness, Inc., Clearwater, Fla.
For primary bibliographic entry see Field 5G.
W77-00611

THE EFFECT OF DIGESTED SLUDGE ON SOIL BIOLOGICAL ACTIVITY,
Wyzsza Szkola Rolnicza, Wroclaw (Poland).
M. W. Varanka, Z. M. Zablocki, and T. D. Hinesly.
Journal Water Pollution Control Federation, Vol. 48, No. 7, p 1728-1740, July, 1976. 3 tab, 71 ref.

Descriptors: *Sludge, *Soil amendments, *Soil analysis, *Microenvironment, *Enzymes, Kinetics, Municipal wastes, Microbiology, Bacteria, Fungi, Actinomycetes.
Identifiers: Soil biological activity.

The effect of continuous heavy applications of digested municipal sludge to cropland on the main systematic groups of soil microflora and enzymatic activity was studied using soil samples from control and sludge-amended Blount silt loam soil. Anaerobically digested sludge was appled each year for 6 years to the amended soil, resulting in accumulative loading rates of 0, 92, 184, and 369 metric tons/hectare. No clear-cut restrictions in microbial populations and their activities were observed with the sludge-amended soil samples. Although total bacteria, fungi, and actinomycetes populations were never less in maximum sludge-treated plots, a significant increase in the populations for each of the major groups as a result of sludge application was recorded only once during three sampling dates. Percentage of denitrifiers, protease, and amylase activities were increased as a result of sludge application; while invertase and urease activities were unaffected by sludge treatment. Only the percentage of Azotobacter and cellulase activity were decreased by sludge treatment. (Kreager-FIRL)
W77-00612

WASTEWATER IRRIGATION - THE PRICE IS RIGHT,
Santa Rosa Public Works, Calif.
B. J. Riha, and R. L. Mills.
American City and County, Vol. 91, No. 3, p 55-57, March, 1976.

Descriptors: *Water reuse, *Reclamation, *Irrigation, *Waste water treatment, *Reclaimed water, Municipal wastes, Farms, Treatment facilities, Projects, Construction, Regional development, Biochemical oxygen demand, Suspended solids, Dairy industry, Coliforms, *California, Cities.
Identifiers: Santa Rosa(Calif).

A waste water reclamation program being developed by the city of Santa Rosa, California is described. The city has embarked on a full-scale waste water irrigation program by taking the entire discharge from its 6.5 million gallon/day West College Avenue treatment plant and distributing it to local dairy ranchers for the irrigation of about 1000 acres of pasture grass and feed crops. The city has also started construction on a major expansion of its Laguna waste water treatment plant; and when completed in early 1978, an additional 10 million gallons/day of effluent will be diverted to the land. The Laguna plant will also serve as a regional treatment facility for the entire Santa Rosa Plain. The regional reclamation plan will effectively achieve zero discharge of waste water to neighboring streams during the dry summer months. Effluent quality at the West College Avenue plant is high, with biochemical oxygen demand and suspended solids removal averaging 85%. The most probable number of coliform organisms does not exceed 2.2/milliliter. The plant diverts its effluent during about 6 months of the year to four holding basins spaced along a 6-mile gravity aqueduct which is bordered on both sides by dairy and beef cattle ranches. Standpipes along the route permit ranchers to tap the storage ponds for sprinkler or flood irrigation. (Kreager-FIRL)
W77-00613

LET'S CONSIDER LAND TREATMENT, NOT LAND DISPOSAL,
Cold Regions Research and Engineering Lab., Hanover, N. H.
A. Ulga.
Civil Engineering-ASCE, Vol. 46, No. 3, p 60-62, March, 1976.

Descriptors: *Waste water treatment, *Infiltration, *Water reuse, *Percolation, *Potable water, Economics, Nitrogen, Viruses, Pathogenic bacteria, Coliforms, Waste water disposal, Design criteria.
Identifiers: Land application.

The use of land application for the treatment of waste water is discussed in terms of pretreatment requirements, disinfection requirements, application rates, hydraulic considerations, and economics. An engineered land treatment system can produce high quality potable water using simple pretreatment and limits the problem of disposing of sludges. Virus, pathogenic bacteria, and coliforms are completely removed by percolation through a 5-foot depth of soil under controlled slow infiltration design conditions. Survival times are typically a maximum of 2-3 months for organisms retained on soil particles. The application rate of waste water is limited by the nitrogen uptake potential of the vegetative cover; however, once this limitation is satisfied, as much water as possible should be applied to minimize costs, assuming no other limitations exist. The cost of land treatment is lower than that associated with the use of septic tanks for both rural and suburban areas. (Kreager-FIRL)
W77-00614

WATER HYACINTHS FOR UPGRADING SEWAGE LAGOONS TO MEET ADVANCED WASTEWATER TREATMENT STANDARDS: PART I.
National Space Technology Labs., Bay St. Louis, Miss.
B. C. Wolverton, and R. C. McDonald.
Available from the National Technical Information Service, Springfield, VA 22161, as N76-10697, $3.50 in paper copy, $3.00 in microfiche. Report NASA-TM-X-72729, October, 1975. 9 p, 2 tab, 12 ref.

Descriptors: *Waste water treatment, *Sewage treatment, *Sewerage, *Biochemical oxygen demand, *Treatment facilities, *Water hyacinths, Sewage, Waste wate(Pollution), *Water quality standards.

Water hyacinths were studied as a means of accomplishing final filtration to remove nutrients, heavy metals, and other chemicals from domestic waste waters. Biweekly grab samples from before and after saturating a secondary domestic sewage lagoon were compared with samples from a control lagoon free of water hyacinths. The water hyacinth-covered lagoon had a surface area of 0.70 acre with a total capacity of 1.5 million gallons, receiving an inflow of 115,000 gallons per day from a 3.8 acre aerated primary sewage lagoon. Retention times varied between 14 and 21 days depending on the water hyacinth evapotranspiration rates. The water hyacinths functioned as an efficient and inexpensive final filtration system in a secondary domestic sewage lagoon during a three month test period. They reduced the suspended solids, biochemical oxygen demanding substances, and other chemical parameters to levels below the state standards. While absorbing organics, nutrients, and other chemical elements

from sewage waste, they produced large quantities of plant material. When grown in enriched sewage waste free of heavy metals, this biomass can be harvested and possibly processed into valuable feed products, organic fertilizer and soil conditioner, or methane gas and inorganic fertilizer. The volume of water hyacinths required depends on the amount of sewage to be processed and the desired purity of the final waste water. (Snyder-FIRL)
W77-00621

IMPROVED LIQUID-SOLIDS SEPARATION BY AN ALUMINUM COMPOUND IN ACTIVATED SLUDGE TREATMENT,
Nalco Chemical Co., Oak Brook, Ill.
C. F. Lenhart, and J. W. Cagle.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 228, Price codes: A04 in paper copy, A01 in microfiche. Report EPA-600/2-75-039, September, 1975. 71 p, 34 fig, 3 tab, 9 ref.

Descriptors: *Waste water treatment, *Activated sludge, *Treatment facilities, *Phosphorus, *Sludge digestion, Settling velocity, Chemicals, Sewage treatment, *Separation techniques.

A study was undertaken to determine the effects of sodium aluminate additions on the activated sludge waste treatment process. Data were compared for periods with and without chemical dosing. Waste water throughout the study was typical of the normal domestic sewage treated at the plant studied. The only attempts to adjust plant flow or treatment conditions were those necessary to maintain good, efficient waste water treatment operations. It was demonstrated that feeding liquid alkaline alumina to a 2.5 million gal per day activated sludge waste water treatment plant is a practical method of gaining several operational benefits. The increased sludge density permitted the plant to protect itself against solids washout during spot flows greater than 164% of designed plant capacity. Solids handling and ease of sludge volume index control were improved. Aluminate application allowed higher levels of mixed liquor suspended solids to be retained in the secondary clarifier. The improved solids removal with sodium aluminate reduced the loading on the tertiary treatment unit. Additional benefit was noted in the concentration of aerobically digested solids. Phosphorus removal approaching 80% was achieved with feed rates of 10 mg/liter as aluminum. The most efficient point to treat the mixed liquor stream was at the outlet of the primary basin. Residual benefits accrued for 10 days after aluminate feed was stopped. It took from 3 days to a week after starting the aluminate to produce optimum conditions in the secondary clarifier. Improved solids settling occurred within 24 hr of startup. Thicker return sludge resulting from the use of sodium aluminate permitted a substantial reduction in waste activated sludge volumes to be handled. (Snyder-FIRL)
W77-00622

DEMINERALIZATION OF WASTEWATER BY ELECTRODIALYSIS,
Environmental Protection Agency, San Francisco, Calif.
H. H. Takenaka, C. L. Chen, and R. P. Miele.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 102, $4.00 in paper copy, $3.00 in microfiche. Report EPA-600/2-75-047, October, 1975. 35 p, 6 fig, 9 tab.

Descriptors: *Waste water treatment, *Chemical oxygen demand, *Electrodialysis, *Treatment facilities, *Sewage, Effluents, Membranes, Cost analysis, Waste water(Pollution), Activated sludge, *Demineralization.

An electrodialysis pilot plant study was carried out to investigate the use of the process for waste waterdemineralization. The study was conducted using a 12 gpm electrodialysis pilot plant and the carbon-treated secondary effluent of the Pomona activated sludge plant. Stack fouling due to slime occurred whenever an increase in stack pressure was accompanied by a decrease in stack electric current or demineralization. This organic fouling significantly decreased the effectiveness of the process. An enzyme detergent was successful in removing most of the slime on the membranes, however, heavy slime formation in the stack was not removed. If the chemical oxygen demand (COD) of the feedwater remained at 10 mg/liter or less, a weekly enzyme detergent flush maintained the total dissolved solids (TDS) removal in the design range of 30-35%. An acid solution was required after the enzyme detergent flush to remove the detergent and restore the stack amperage. Other forms of fouling, such as membrane scale, were not as serious a problem. An acid solution effectively removed scale formation. The cost to produce water with 30 to 35% TDS reduction in a 10 MGD single stage electrodialysis plant was estimated at about $0.194 per 1,000 gallons of product water, not including the costs of carbon adsorption pretreatment and brine disposal. (Snyder-FIRL)
W77-00623

SELF-MONITORING PROCEDURES: BASIC LABORATORY SKILLS,
Charles County Community Coll., LaPlata, Md.
For primary bibliographic entry see Field 5A.
W77-00624

DEMONSTRATION OF A PLANNING PERSPECTIVE FOR WASTE WATER SLUDGE DISPOSITION KNOXVILLE/KNOX COUNTY,
Environmental Protection Agency, Washington, D.C., Water Planning Div.
D. Neptune, M. Wyatt, and R. Heil.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 936, $7.50 in paper copy, $3.00 in microfiche. Report EPA-440-9-76-001A, November, 1975. 177 p, 22 fig, 30 tab, 41 ref, 4 append.

Descriptors: *Waste water treatment, *Sewage treatment, *Sewerage, Analytical techniques, *Treatment facilities, *Planning, Sludge disposal, Sludge, Waste disposal, Disposal, Management, Project planning, Cost analysis, Reclamation, Industrial wastes, *Tennessee.
Identifiers: *Knoxville(Tenn).

The existing and future sludge disposal problem in Knoxville, Tennessee was investigated. The techniques employed in the projection of the present and future sludge quantities and qualities; selection of feasible sludge handling, transportation, and ultimate disposal or resource recovery methods; and the evaluation of these methods compiled into management plans were derived from a methodology previously developed by the Environmental Protection Agency. Six sludge management plans were found feasible for further consideration. They are sanitary landfill of a digested, dewatered sludge; trench-incorporation of a digested, dewatered sludge; incineration of an undigested, dewatered sludge from most treatment plants and sanitary landfill of a digested, dewatered sludge from two outlying plants; land application by spray irrigation of a digested sludge from most plants and landfill of a digested, dewatered sludge from an outlying plant; land application by composting and disking of a digested, dewatered sludge from most plants and landfill of a digested, dewatered sludge from an outlying plant; and producing fertilizer from digested sludge. None appear to present insurmountable problems in terms of meeting environmental constraints, performance criteria, or institutional and legal feasibility. However, the spray irrigation plan appears less cost-effective than the other five. (Snyder-FIRL)
W77-00626

INSPECTION MANUAL FOR THE ENFORCEMENT OF NEW SOURCE PERFORMANCE STANDARDS: SEWAGE SLUDGE INCINERATORS,
PEDCo-Environmental, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 5G.
W77-00627

A PASSIVE FLOW MEASUREMENT SYSTEM FOR STORM AND COMBINED SEWERS,
Grumann Aerospace Corp., Bethpage, N.Y. Research Dept.
K. M. Foreman.
Report EPA-600/2-76-115, May, 1976. 137 p, 71 fig, 1 tab, 6 ref.

Descriptors: *Sewerage, *Analytical techniques, *Flow measurement, *Acoustics, *Sewers, Flowmeters, Design, Instrumentation, Electronic equipment.
Identifiers: Experimental design, Acoustic signatures, Sound level meters, Electroacoustic transducers.

A new, nonintrusive, low cost, passive flow measurement method to meet the urgent needs for good management of storm and combined sewer systems was investigated. The system is based on sensing the near field sound emitted by the disturbed flow at a channel discontinuity. These local pressure pulses, called pseudosound, radiate as dipole sound sources orthogonal to the flow direction. Flow rate is indicated by the output signal of passive transducers, such as accelerometers, attached to the outer wall of the channel, after processing by a Fourier Analyzer. Laboratory tests using full scale sewer pipe elements and a brief series of field tests measuring sanitary sewage flow demonstrated its feasibility for channels where a discontinuity exists because of a conduit cross-sectional increase. The acoustic emission has been found to produce unambiguous signals that increase in magnitude as the fluid flow rate increases. Low cost accelerometers having a wide range of voltage sensitivities, between 10 and 100 mv/g, were found to be well suited to the acoustic monitoring function. Inexpensive but effective techniques to properly simulate sewer installations were developed. The most reliable unambiguous signal for flow rate measurement is the acoustic emission component at a characteristic frequency, which is inversely proportional to the maximum geometric step at the discontinuity and directly proportional to the bulk sound speed of the fluid. Qualitative evaluation of total sound content from various and diverse remote sites can provide a mental image of local sewer conditions that almost rivals in situ observations by a mobile crew, but with greater convenience and lower cost. Recommendations for further field site testing using an instrumented sewer line are made. (Snyder-FIRL)
W77-00628

WASTEWATER RECLAMATION PROJECT, ST. CROIX, U.S. VIRGIN ISLANDS,
Black, Crow and Eidsness, Inc. Gainesville, Fla.
O. K. Buros.
Report EPA-600/2-76-134, June, 1976. 259 p, 43 fig, 7 tab, 29 ref, append.

Descriptors: *Waste water treatment, *Biological treatment, *Treatment facilities, *Waste treatment, *Groundwater recharge, Reclamation, Reclaimed water, Water reuse, Virgin.
Identifiers: Water reclamation, Waste water reclamation, Artificial groundwater recharge.

A portion of the flow normally discharged to the sea from St. Croix's primary treatment plant was used for reclamation purposes. It was first processed in an advanced waste water treatment plant (AWWTP) by biological and physiochemical means. The treated waste water was conveyed by a force main to recharge areas located about 1 1/4 mi away. Here it was stored in a holding tank and

introduced into the groundwater aquifers by spray irrigation and spreading basins. The project was for the purpose of improving the yield of wells and assisting in preventing further seawater intrusion of a major well field. Background data on water quality and quantity in the area was collected for 2 1/2 yr before recharging began. Recharging was carried out for 8 mo. The best recharging method proved to be with spreading basins in an alluvial valley. The cost for treatment, recharging, and recovery was estimated at about $2.15/thousand gal at 0.5 mgd, the rate used in the study. The project demonstrated that it is possible to economically augment the island's freshwater reserves through using reclaimed waste water to artificially recharge groundwater. There was evidence of a notable increase in available groundwater in the vicinity of the recharge activities. The major problems included lack of sufficient waste water for treatment and recharge, mechanical failure of treatment equipment, and transfer to the central treatment plant of waste water containing a high percentage of sea water. Artificial groundwater recharge can only be accomplished successfully at carefully selected areas on St. Croix. The recharging activities did not significantly affect the water quality of pumped wells. (Snyder-FIRL)
W77-00630

DEMONSTRATION OF A PLANNING PERSPECTIVE FOR WASTE WATER SLUDGE DISPOSITION.
For primary bibliographic entry see Field 5E.
W77-00631

THE LABORATORY EVALUATION OF A METHOD FOR ENHANCING THE KINETICS OF ACTIVATED SLUDGE TREATMENT PLANTS,
Houston Research, Inc., Tex.
S. J. Sedita.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 683, Price codes: A04 in paper copy, A01 in microfiche. Report EPA-600/2-75-061, October 1975. 72 p, 23 fig, 18 tab, 11 ref, append.

Descriptors: *Waste water treatment, *Activated sludge, *Sewage treatment, *Organic compounds, *Enzymes, Evaluation, Laboratory tests, Kinetics.
Identifiers: *Bacterial extracts.

The activated sludge process was studied in the laboratory to determine the technical feasibility that disrupting a portion of the microbial cells in the return sludge will enhance the operating efficiency and capacity of municipal activated sludge plants. Activated sludge from a Bellaire, Texas, plant was acclimated to five different test compounds: 2,4-dichlorophenol, linear alkylate sulfonates, nitrilotriacetic acid, ethylene dinitrilotetraacetic acid, and ethylene glycol. The test compounds were then incorporated into waste water influent and fed to the acclimated sludge which had been mechanically disrupted, to varying degrees, by sonic energy. Significant amounts of soluble materials were released from the concentrated sludge in the form of total organic carbon. A significant portion of the microorganisms found in concentrated sludge are killed by sonication. The substrate removal activity of disrupted sonicated sludge is not significantly different from undisrupted sludge having a thousand times the cell concentration, and the cell free supernate from disrupted sludge may have substrate removal activity up to 10 times that of normal sludge. It may be possible to significantly increase throughput capacity by using a combination of normal return sludge and disrupted sludge of supernate. (Snyder-FIRL)
W77-00633

GRAVITY CLARIFIER,
G. F. Jackson.
U.S. Patent No. 3,965,013, 6 p, 7 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 947, No 4, p 1727, June 22, 1976.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, *Water purification, Gravity, Flow characteristics, Sludge, Sludge treatment, Settling basins, Equipment.
Identifiers: *Gravity clarifiers.

The type of gravity clarifier described is one in which the liquid flow patterns are derived from the energy of the influent liquid mixture which flows tangentially into the circular tank. The sludge is moved in toward the center of the base of the tank. The upward velocity of the flow of liquid toward the outlet provides a decreasing velocity of flow to the point where the velocity is low enough so that suspended solid matter can be released and by force of gravity carried to the bottom. A radial flow over a weir to an outlet trough is provided for the effluent clarified liquid. The apparatus consists of a cylindrical tank having a closed bottom with a downward depending truncated conical shell attached at its large end to the upper portion of the tank wall, with a peripherial trough near the top end of the tank and a weir for the overflow of effluent liquid into the trough. The influent conduit enters the tank tangentially and flows the raw mixture into the tank in the space between the outside of the inverted conical shell and the tank wall. The sludge is removed from the tank bottom near the center of the tank. (Sinha-OEIS)
W77-00690

TREATING WASTE DISCHARGE LIQUIDS FROM METAL HARDENING BATHS, PARTICULARLY CONTAINING NITRITE AND NITRATE COMPOUNDS,
E. Mohr.
U.S. Patent No. 3,966,508, 4 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 947, No 5, p 2216, June 29, 1976.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Chemical wastes, Water pollution treatment, Water quality control, Evaporation, Condensation, Separation techniques, *Nitrates, *Nitrites.
Identifiers: *Nitrate-nitrite recovery, Cyanides, Hardening baths.

To improve recovery of nitrate-nitrite compounds from effluent of nitriding processes, a melt of the nitrate-nitrite salts is prepared and maintained at a temperature above about 400C. The effluent liquid is introduced into the melt, to evaporate the water and melt the salts contained in it. They merge immediately into the melt and the melt is drawn off by an overflow. The evaporated water is filtered to recover any remaining salts, together with condensation water. The apparatus includes a dispersion device close to the introduction duct of the effluent liquid to prevent introduction of the effluent liquid in a solid stream. This dispersion may be an open pot with a perforated bottom located beneath the surface of the melt, a cartridge with steel wool, or the like. The invention permits a continuous process without boiling over, or foaming. (Sinha-OEIS)
W77-00693

TREATMENT OF AQUEOUS WASTE SOLUTION,
Sumitomo Chemical Co. Ltd., Osaka (Japan). (Assignee).
M. Ohkawa, and Y. Sawaguir.
U.S. Patent No. 3,966,594, 7 p, 5 ref; Official Gazette of the United States Patent Office, Vol 947, No 5, p 2243-2244, June 29, 1976.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Organic wastes, *Water pollution treatment, Chemical oxygen demand, Chemical reactions, Separation techniques, Aqueous solutions, Anions.
Identifiers: Amine compounds.

The invention provides a process for treatment of organic waste water containing water-soluble organic anionic substances. An acidic waste water is contacted with a water-insoluble organic solvent solution of at least one amine. It was found that dibenzylalkylamines can satisfactorily be applied even though it is a mixture of various kinds of waste water or has a fairly high COD value because it has the ability to separate an aqueous layer from an oily layer. Separation into an aqueous and oily layers occurs very rapidly, and the oily layer containing organic anionic substances is separated from the aqueous layer and then subjected to the subsequent alkali back-extraction using an aqueous alkali solution. The continuous treatment is carried out by means of a mixer-settler process or countercurrent process. (Sinha-OEIS)
W77-00694

PROCESS FOR THE TREATMENT OF WASTE WATER FROM A FIBERGLASS MANUFACTURING PROCESS,
Amchem Products, Inc., Ambler, Pa. (Assignee).
T. N. Crowley, and D. M. Urbanski.
U.S. Patent No. 3,966,600, 6 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 947, No 5, p 2245, June 29, 1976.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Water pollution treatment, Water pollution control, Water quality control, Chemical reactions, Flocculation, Separation techniques, Water reuse, *Dissolved solids, *Chemical oxygen demand.
Identifiers: Fiberglass manufacturing.

The invention provides a process for the treatment of waste water from a fiberglass manufacturing process to reduce chemical oxygen demand and also reduce the content of both dissolved and suspended solids. It enables the water to be reused in the industrial processes, so forming a closed cycle which is both more efficient and more economical. The steps are: acidifying the waste water to a pH of from about 2.5 to about 5.5 by the addition of a non-toxic inorganic acid; neutralizing the acidified water to a pH of from about 7 to about 9 by the addition of an nontoxic inorganic base, the base being capable of forming, with the inorganic acid added in the first step, an insoluble inorganic salt; adding a flocculating agent to the neutralized water to promote the separation of solid material from the treated water; and separating the solid material from the treated water. (Sinha-OEIS)
W77-00695

METHOD AND APPARATUS,
Ecodyne Corp., Lenexa, Kans. (Assignee).
C. E. Burkhead.
U.S. Patent No. 3,966,599, 7 p, 2 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 947, No 5, p 2245, June 29, 1976.

Descriptors: *Patents, *Waste water treatment, *Biological treatment, *Water pollution treatment, Water purification, Aerobic treatment, Aerobic conditions, Equipment, *Aeration, Mixing, Biodegradation, *Microbial degradation.

Methods and apparatus are disclosed for treating biodegradable waste products. A liquor of waste products is introduced into a reactor mixing zone comprising a column of fixed media material having a high surface area to volume ratio, a low resistance to liquid flow and a surface condition receptive to aerobic microbial growth. The liquor is circulated in a continuous flow path including the fixed media column. A mechanical surface aerator is positioned in the continuous flow path immediately above the mixing zone to aerate the liquor and distribute it uniformly over the top of the fixed media column. The aeration, distribution and circulation of the liquor are accomplished in a manner to promote homogeneous mixing

throughout the mixing zone and to encourage aerobic microbial growth on the fixed media while minimizing agitation of a nature tending to dislodge the aerobic microbial growth and to develop flocculent aerobic microbes. A sediment receiving zone is provided immediately below an apertured floor of the mixing zone for collection of residual solids. (Sinha-OEIS)
W77-00696

EFFLUENT TREATMENT,
Robinson Brothers Ltd., West Bromwich (England). (Assignee).
A. Stevenson, and N. Harkness.
U. S. Patent No. 3,966,601, 5 p, 4 ref; Official Gazette of the United States Patent Office, Vol 947, No 5, p 2246, June 29, 1976.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Chemical wastes, *Water pollution treatment, Water pollution control, Water quality control, Chemical reactions, Separation techniques, Toxicity, Hydrogen ion concentration, *Chemical precipitation.
Identifiers: *Dithiocarbamates.

Dithiocarbamates are made on a considerable scale and widely used and thus they and related compounds tend to be present in some industrial effluents. They are used in making agricultural fungicides and in the rubber industry. It has been found that although dithiocarbamates are of low toxicity to mammals and birds, they are highly toxic to fish and have a significant and undesirable inhibiting action on the nitrification bacteria whose action is valuable in sewage treatment. Water-soluble dithiocarbamate is not biologically degraded in sewage treatment processes. A process is described for purifying industrial effluent containing dissolved dithiocarbamate by mixing the effluent at a pH of 6 to 8 with soluble heavy metal salt and thereby precipitating heavy metal dithiocarbamate. It is then separated from the effluent. It is essential that the pH of the effluent should be within the range mentioned and if not steps should be taken by addition of water-soluble basic or acidic compounds. (Sinha-OEIS)
W77-00697

LIQUID TREATMENT APPARATUS,
Ecodyne Corp., Lenexa, Kans. (Assignee).
D. G. Mason, and R. B. Higgins.
U.S. Patent No. 3,966,608, 6 p, 2 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 947, No 5, p 2249, June 29, 1976.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Water pollution treatment, *Domestic wastes, Septic tanks, Water quality control, Aeration, Anaerobic conditions, Microorganisms.

Because of the well known pollution problems that are generated by septic tank systems there is a need for a high-efficiency unit for the treatment of biodegradable wastes which is compact, inexpensive and can be used to provide treatment for single-family dwellings. This invention provides a method for treating such wastes. The liquor is delivered to a quiescent settling zone in which large particulates are permitted to settle to the bottom where they are subjected to digestion by anaerobic microorganisms. The liquor is then delivered to an aeration zone and then downward through a column of submerged fixed media. The fixed media is composed of a multiplicity of elements where are freely and randomly stacked on one another providing interstitial area between them. The elements have a high surface area to volume ratio, so that aerobic microorganisms can grow on their surface. As a result of their random stacking and high surface area, the elements promote homogeneous contact of the liquor with the fixed media. The liquor is received at the bottom of the fixed media and recirculated through the aeration zone and back through the fixed media in order to provide multiple passes through the media for thorough treatment. After such treatment the effluent ca be withdrawn from the unit. (Sinha-OEIS)
W77-00699

PACKED-BED REACTORS FOR NITRIFICATION AND DENITRIFICATION OF SECONDARY EFFLUENTS,
Iowa State Univ., Ames. Dept. of Civil Engineering.
J. C. Young.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 607, Price codes: A08 in paper copy, A01 in microfiche. Completion report ISWRRI - 72, Iowa State Water Resources Research Institute Ames, June, 1976. 144 p, 45 fig, 15 tab, 33 ref. OWRT A-052-IA(1). 14-13-0001-4015, 5015.

Descriptors: *Nitrification, *Denitrification, Nitrogen, *Tertiary treatment, Filtration, Effluents, Pilot plants, Biological treatment, *Waste water treatment, *Suspended solids, *Biochemical oxygen demand.
Identifiers: *Packed-bed reactors.

Upflow packed-bed reactors (PBR) have been investigated to determine their usefulness as a tertiary treatment process to further reduce biochemical oxygen demand (BOD) and suspended solids (SS) from secondary effluents and to remove nitrogen by biological nitrification and denitrification. Laboratory-scale units were used to help identify system design parameters and to study the effect of such variables as temperature, detention time, oxygen concentration and packing material. Pilot-scale studies using secondary effluent were performed to help identify operating problems and to determine PBR performance in a more realistic treatment situation. These tests have shown that the PBR process can remove about 50% of the carbonaceous BOD and suspended solids from a secondary effluent. Another 20% to 30% can be removed by granular-media filtration. Biological nitrification could be achieved at flow rates below about 0.5 gpm/ft2 (1.25 m/h) and denitrification could be achieved at flow rates less than about 1.0 gpm/ft2 (2.5 m/h). Granular media such as crushed sand or coal or modular plastic media provided about equal performance, but were subject to plugging especially when using the PBR for denitrification. A complete tertiary treatment system consisting of packed-bed reactors for BOD removal, nitrification and denitrification and granular-media filters for final polishing can provide an effluent with BOD, SS and nitrogen concentrations comparable to that which can be achieved by physical-chemical treatment including activated carbon adsorption for removal of organic materials.
W77-00733

THE EFFLUENT TREATMENT PLANT OF BASF AG IN LUDWIGSHAFEN/RHINE,
Badische Anilin- und Soda-Fabrik A.G., Ludwigshafen am Rhein (West Germany).
H. J. Frost.
Centre Belge d'Etude et de Documentation des Eaux, Vol. 29, No. 390, p 221-228, May, 1976. 12 fig, 1 tab, 3 ref.

Descriptors: *Chemical industry, *Waste water treatment, *Treatment facilities, *Industrial wastes, *Activated sludge, Biological treatment, Separation techniques, Chemical wastes, Sludge treatment, Dewatering, Incineration, Liquid wastes, Solid wastes, Sewerage, Waste disposal.

The effluent treatment plant of BASF works in Ludwigshafen, the largest chemical complex in Europe, is described. Wastes from the chemical complex are segregated into contaminated and uncontaminated types and are handled by two separate drainage systems. Uncontaminated wastes which are used for cooling purposes are discharged into a system which also receives sewage from the city of Ludwigshafen. Contaminated wastes are discharged separately for treatment at the effluent purification plant. After neutrilazation and passage through a coarse bar screen, contaminated wastes are then passed to the treatnent plant where they flow through fine screens and roughing tanks. The raw wastes are equally distributed in activated sludge units, and the mixed liquor flows through a secondary sedimentation basin from which purified water is discharged into the Rhine River. Settled sludge is partly recycled into the activated sludge units. Excess sludge and primaary sludge from the roughing tanks pass to a thickener unit and are dewatered in filter presses after mixing with ash, lime, and iron salts. The filter cake is burned in several fluid bed incinerators. (Kreager-FIRL)
W77-00742

PURIFICATION OF INDUSTRIAL WASTE WATER - HAVING HIGH CONCENTRATION OF DISSOLVED SOLIDS BY TREATMENT WITH STRONG ACIDS OR BASES TO GIVE FERTILISERS AND FEED ADDITIVES.
French Patent FR 2286-121. Issued May 28, 1976. Derwent French Patents Abstracts, Vol. X, No. 28, p D3, 1976.

Descriptors: *Patents, *Food processing industry, *Waste water treatment, *Reclamation, *Byproducts, Fertilizers, Additives, Feeds, Filtration, Evaporation, Separation techniques, *Industrial wastes, Dissolved solids, Water purification.

A patent for an industrial waste water purification method which yields fertilizers and feed additives as byproducts is described. The method involves the following steps: the automatic separation of water with a high dissolved solids concentration from water with a low dissolved solids concentration; mixing the high dissolved solids fraction with strong acids or bases to obtain stable salts; filtration to remove insoluble and precipitated substances; concentration of the solution by evaporation up to the saturation point with respect to the least soluble salts; crystallization of the concentrated solution in one or more stages; and consecutive separation of mineral salts from the mother liquor which is rich in organic substances. The separated salts can be used as fertilizer or feed additive, and the residual water may also be used as a feed additive. The process is particularly suitable for waste water from food processing operations such as sugar refineries, distilleries, the fermentation industry, and the starch and dextrin industry. (Kreager-FIRL)
W77-00743

EFFECTS OF SELECTED IONS ON THE REMOVAL OF CHROME (III) HYDROXIDE,
Notre Dame Univ., South Bend, Ind. Dept. of Civil Engineering.
M. J. Thomas, and T. L. Theis.
Journal Water Pollution Control Federation, Vol. 48, No. 8, p 2032-2045, August, 1976. 14 fig, 6 tab, 14 ref.

Descriptors: *Chromium, *Waste water treatment, *Industrial wastes, *Chemical precipitation, *Ions, Chemical wastes, Metals, Carbonates, Phosphates, Chemical reactions, Colloids, Coagulation.
Identifiers: Metal finishing industry.

The effects of anionic and metal ion impurities on the removal of chromium wastes generated during metal finishing rinse operations are reviewed. The removal technique considered involves the reduction of chromate-bearing waste to chromium (III) under acid conditions (pH of 3) followed by precipitation of chromium (III) hydroxide under slightly alkaline conditions. The coagulation and settling of colloidal chromium hydroxide are shown to be a function of both the quantity and

type of impurity ions present. Troublesome ions such as carbonates and phosphates which have their origin in rinse baths should be kept segregated from wastes containing chromium (VI). A second option to eliminate difficulties caused by carbonates and phosphates is to modify the treatment scheme for the combined waste. An example is the use of lime instead of caustic soda for neutralizing the waste after chemical reduction of chromium (VI) to chromium (III) has occurred. The use of lime will cause the precipitation and removal of most of the carbonate and phosphate species from solution while also providing doubly charged counterions to aid in the coagulation of the negatively charged chromium hydroxide colloid that exists at pH values of above 8. (Kreager-FIRL)
W77-00744

A SYSTEMS APPROACH TO THE ECONOMICS OF WASTE HANDLING,
Aston Univ., Birmingham (England). Dept. of Chemical Engineering.
A. V. Bridgwater, S. A. Gregory, C. J. Mumford, and E. L. Smith.
Resource Recovery and Conservation, Vol. 1, No. 1, p 3-23, May, 1975. 3 fig, 5 tab, 58 ref.

Descriptors: *Oil industry, Economics, *Waste treatment, *Waste disposal, *Reclamation, Cost-benefit analysis, *Costs, Industrial wastes, Recycling, Transportation.

A systems approach to the economics of treatment, transport, disposal and recycling of wastes is presented. Costs for each stage in the waste handling process are presented along with an introduction to cost-benefit analysis. Total costs of alternative ways of recycling, treating, or disposing of specific wastes are handled by summing relevant unit costs. Cost information provided is not intended to be exhaustive; rather, it is simply indicative of the availability of data and areas where additional information is needed. The effects of new legislation and changes in industrial material production and usage patterns on the economics of waste handling are also discussed. Examples of alternatives to waste disposal such as the burning of waste lube oil for its heat content are suggested. (Kreager-FIRL)
W77-00745

REMOVAL AND RECOVERY OF CYANIDE AND ZINC FROM ELECTROPLATING WASTES BY SOLVENT EXTRACTION,
Oak Ridge National Lab., Tenn.
F. L. Moore, and W. S. Groenier.
Plating and Surface Finishing, Vol. 63, No. 8, p 26-29, August, 1976. 1 fig, 4 tab, 12 ref.

Descriptors: *Zinc, *Metals, *Industrial wastes, *Reclamation, *Waste water treatment, Chemical wastes, Water reuse, Solvent extractions, Separation techniques, Feasibility studies.
Identifiers: *Cyanides, *Electroplating industry wastes.

The feasibility of using solvent extraction for the removal and recovery of cyanide and zinc from electroplating wastes was investigated in a laboratory-scale continuous mixer-settler. Quaternary amines were used to extract the zinc and cyanide wastes, and regeneration of the amine solent for recycle was achieved by stripping it with dilute sodium hydroxide. Free cyanide and zinc cyanide were successfully removed, concentrated, and recovered during 60 runs in which 100 liters of actual rinse solutions from an industrial electroplater were treated. The process yielded two useful products, the decontaminated water and a sodium hydroxide concentrate containing the recovered chemicals. The extraction and stripping of cyanide and zinc throughout the process were essentially quantitative. Amine losses to the aqueous raffinate averaged in the 30-50 ppm range. (Kreager-FIRL)
W77-00747

BRILLIANT NON-CYANIDE ZINC PLATING.
Industrial Finishing, Vol. 52, No. 6, p 48-51, June, 1976.

Descriptors: *Industrial wastes, *Waste water treatment, *Zinc, *Electrochemistry, Nickel, Cadmium, Chemical precipitation, Settling basins, Sludge disposal, Dewatering, Waste treatment, Effluents, Chemical wastes.
Identifiers: Metal plating industry, Metal finishing industry, Zinc plating, Cyanide, Electro-plating.

A non-cyanide zinc plating system that minimizes cyanide contamination of plant effluent is described. The system employs Kenlevel II chloride zinc solution at a current density of 200 amperes/barrel and an operating voltage of 6.5-7 volts. Asarco high purity zinc ball anodes are used along with a Koroseal-lined dip tank. Rinse waters from zinc plating as well as nickel plating and black oxide treatment operations are routed to treatment, precipitation, and settling tanks. Chromate rinse and cadmium rinse containing any cyanide are treated at the point of use prior to being routed to precipitation and/or treatment reservoirs. Caustic soda which is added to the various rinse waters in the reservoirs precipitates the metals which are allowed to settle. Clear liquid which is adjusted to the proper pH is drawn off and allowed to seep into porous subsoil around the plant. Sludge is periodically drawn off or pumped out and dried for subsequent land fill disposal. (Kreager-FIRL)
W77-00748

FIGHT AGAINST POLLUTION AND NUISANCES IN THE FRENCH STEEL INDUSTRY (LUTTE CONTRE LES POLLUTIONS ET NUISANCES DANS LA SIDERURGIE FRANCAISE),
R. Chantereau, P. Geny, and J. Raguin.
La Technique Moderne, No. 6, p 70-75, June, 1976. 9 fig, 2 tab.

Descriptors: *Steel, *Industrial wastes, *Air pollution, *Waste water treatment, *Ammonia, Biological treatment, Acidic water, Neutralization, Flotation.
Identifiers: Hot dissociation.

Pollution control in the steel industries is reviewed. The ammonia contained in coke gases is absorbed by water which is then stripped, producing fumes which are incinerated and waste waters which are biologically treated. The agglomeration of minerals is a source of dust and smoke emissions; the dust is usually removed by electrofilters and has to remain under 150 mg/cu m at STP. Oxygen steel plants produce refinery gases (CO) and diffuse smoke. The gases can be collected without or with CO combustion; in the latter case, excess gas burners are used along with venturi scrubbers. Smoke is treated through a mixer unit which collects the smoke and removes dust and through a second unit which consists of three converters. Cold rolling waste waters go through a number of processes consisting of the neutralization of acid waters with calcium carbonate, the hot dissociation of oil-water emulsions, the de-oiling of the rolling waters by electroflotation, the continuous cold treatment of emulsions, and the treatment of electrolytic degreasing waters by air flotation. Waters thus treated will have a pH of 7.5, a total iron content under one mg/liter, and a sludge water content of 70%. (Takacs-FIRL)
W77-00749

PROCESS FOR GASIFYING CARBONACEOUS SOLIDS AND REMOVING TOXIC CONSTITUENTS FROM AQUEOUS EFFLUENTS,
Exxon Research and Engineering Co., Linden, N. J. (Assignee).
M. L. Gorbaty.
United States Patent 3,975,168. Issued August 17, 1976. Official Gazette of the United States Patent Office, Vol. 949, No. 3, p 1081-1082, August, 1976. 1 fig.

Descriptors: *Chemical wastes, *Sulfides, *Waste water treatment, *Air pollution, *Trace elements, Effluents, Industrial wastes, Hydrogen sulfide, Chemical precipitation, Separation techniques.
Identifiers: Gasification, Scrubber effluents.

A patent for a process which allows for the gasification of carbonaceous solids and the removal of toxic constituents from off-gas scrubber effluents is described. Carbonaceous feed material is reacted with steam to produce a raw product gas containing methane, hydrogen, carbon monoxide, carbon dioxide, and hydrogen sulfide. Heat is generated by the combustion of the carbonaceous solids to produce a raw flue gas having a lower hydrogen sulfide content than the raw product gas. This flue gas also contains toxic trace elements. The raw product gas is scrubbed with water to produce a product gas scrubber effluent containing hydrogen sulfide, and the raw flue gas is scrubbed with water to produce a flue gas scrubber effluent containing toxic trace elements. The two scrubber effluents are combined, and gases from the combined effluent are then stripped to produce an aqueous stripper effluent. Thereafter, precipitated trace element sulfides are removed from the aqueous stripper effluent. (Kreager-FIRL)
W77-00751

CHEMICAL CHARACTERISTICS AND ACUTE TOXICITY OF FOAM ON TWO AERATED LAGOONS,
International Pacific Salmon Fisheries Commission, Cultus Lake (British Columbia). Sweltzer Creek Salmon Research Lab.
For primary bibliographic entry see Field 5C.
W77-00752

WET AIR OXIDATION OF ALKALINE PULP LIQUORS.
Australian Patent 472,619. Issued May 27, 1976. Australian Official Journal of Patents, Trade Marks, and Designs, Vol. 46, No. 18, p 1763, May 27, 1976.

Descriptors: *Patents, *Pulp and paper industry, *Waste water treatment, *Chemical wastes, *Oxidation, *Evaporation, Incineration, Industrial wastes.

A patent for a process to treat alkaline pulping black liquor is described. The process involves subjecting the raw black liquor to wet air oxidation at a pressure between 500 and 1000 pounds/sq in and a temperature of between 220 and 280C. After substantial evaporation occurs, the residue is incinerated in a furnace. (Kreager-FIRL)
W77-00753

DETOXIFICATION OF BLEACHED KRAFT MILL EFFLUENTS,
British Columbia Research Council, Vancouver.
J. C. Mueller, and C. C. Walden.
Journal Water Pollution Control Federation, Vol. 48, No. 3, p 502-510, March, 1976. 3 fig, 4 tab, 15 ref.

Descriptors: *Pulp wastes, *Waste water treatment, *Activated sludge, *Lagoons, *Aeration, Biological treatment, Foam separation, Toxicity, Biochemical oxygen demand, Chemical wastes, Industrial wastes.
Identifiers: *Detoxification.

Removals of 5-day biochemical oxygen demand and toxicity from bleached kraft mill effluents were assessed for a 5-day retention aerated lagoon, a 24-hour extended activated sludge system, and a 6-hour retention activated sludge system operating under conventional and modified conditions. The 5-day lagoon, operating on direct feed but subject to upset during periods of nutrient deficiency and by remixing of scum, detoxified only 52% of the samples. In contrast, the same

lagoon operated with surge equalization under quiescent conditions and without remixing of scum detoxified 98% of the samples. The 24-hour system with poor mixing detoxified 85% of the samples and achieved a 94% detoxification success rate when operated with good mixing. The 6-hour system with direct feed and good mixing detoxified 68% of the samples. A modified 6-hour system in which pretreatment by foam fractionation preceded 6-hour retention activated sludge treatment detoxified 96% of the samples. All three systems operating under convention conditions aperiodically failed to detoxify effluents. (Kreager-FIRL)
W77-00754

ZINC REMOVAL FROM VISCOSE PLANT EFFLUENT - BY EXTRACTION WITH ALKYL PHOSPHORIC ACID INTO AN ORGANIC SOLVENT AND RE-EXTRACTION DECOMPOSITION THEREFROM.
South African Patent ZA 7406-710. Issued April 22, 1976. Derwent French Patents Abstracts, Vol. X, No. 26, p D1, May, 1976. 3 fig.

Descriptors: *Patents, *Solvent extractions, *Textiles, *Zinc, *Waste water treatment, Solubility, Metals, Chemical reactions, Industrial wastes, Chemical wastes, Liquid wastes.
Identifiers: Textile industry.

A patent for a process to remove zinc from aqueous solutions of viscose plant effluent is described. The process comprises a liquid-liquid extraction with a solution of a dialkyl phosphoric acid in an organic solvent such that the zinc and alkyl phosphoric acid form a compound which is more soluble in the organic solvent than in the aqueous solution. The organic solvent is then separated from the aqueous solution. The separated organic solvent is separated with an aqueous solution to split the compound formed and to redissolve the zinc in the aqueous solution. The zinc-free organic solvent is then separated from the aqueous solution and returned to the extraction step. The dialkyl phosphoric acid is characterized by having alkyl constituents containing at least four carbons in straight branched cyclic alkyl, or phenyl configurations. (Kreager-FIRL)
W77-00756

ELIMINATION OF ZN FROM WASTEWATER OF RAYON PLANTS BY PRECIPITATION,
Akzo Research Labs., Arnhem (Netherlands).
H. C. DeJong.
Resource Recovery and Conservation, Vol. 1, No. 4, p 369-379, June, 1976. 4 fig, 4 tab, 10 ref.

Descriptors: *Textiles, *Zinc, *Reclamation, *Waste water treatment, *Chemical precipitation, Recycling, Industrial wastes, Chemical, Chemical wastes, Metals, Solubility, Treatment facilities.
Identifiers: Textile industry, Rayon plants.

The removal and recovery of zinc from rayon plant waste water by precipitation is discussed along with a commercial zinc removal process known as the fluidized layer system. The fluidized layer process is based on a two-step neutralization of the influent. In the first neutralization stage, impurities such as ferric ion, cellulose, sulfur, and zinc sulfide are removed. A precipitate of zinc hydroxide formed in the second step. The process allows for the reuse of zinc after formed zinc hydroxide sludge has been dissolved in sulfuric acid. Bench-scale application of the fluidized layer system to waste water from rayon plants yielded an effluent with a zinc content of 0.22 ppm. A theoretical discussion of factors affecting the solubility of zinc hydroxide is presented along with methods for the characterization of zinc hydroxide precipitate. (Kreager-FIRL)
W77-00757

LARGE-SCALE EFFLUENT TREATMENT IN THE DYESTUFFS INDUSTRY.
International Dyer and Textile Printer, Vol. 156, No. 2, p 79, 81, July 9, 1976.

Descriptors: *Textiles, *Dyes, *Waste water treatment, *Treatment facilities, *Municipal wastes, Flocculation, Sedimentation, Biological treatment, Aeration, Sludge, Incineration, Waste disposal, Industrial wastes, Dewatering.
Identifiers: Dyestuff industry, Textile industry.

A large-scale effluent treatment plant in the dyestuffs industry which also treats 14,000 cu m/day of municipal sewage from nearby communities is described. The treatment plant covers an area of about 30,000 sq m and comprises about 30 treatment stations grouped to form the following major plant sections: chemical/physical section, clarifying section, biological section, and sludge and waste incineration section. The effluent from the chemical works is pretreated in the chemical/physical section at a feed rate of up to 800 cu m/hour. This section comprises an acidic flocculation and flotation stage, an alkaline flocculation and sedimentation stage, and a buffer basin. Municipal sewage is pretreated in a mechanical clarifier and runs parallel to the industrial effluent treatment line. Biological sewage treatment occurs in four treatment lines for aeration, deaeration, and secondary settling. A total of 635 cu m of sludge settle out daily in the acidic and alkaline flocculation stage and in the biological treatment stage. This sludge is dewatered in a number of thickeners and is then burned in a fluidized bed furnace. (Kreager-FIRL)
W77-00758

RECLAIMING WATER,
V. Montgomery.
Modern Textiles, Vol. 57, No. 8, p 36, 38, August, 1976.

Descriptors: *Textiles, *Dyes, *Reclamation, *Water reuse, *Waste water treatment, *Reclaimed water, Automation, Recycling, Treatment facilities, Equipment, Economics, Filtration.
Identifiers: Textile industry.

A water reclamation system at a textile dyeing plant is described. The system recycles 1,900,000 gallons of water/day and can hold 80,000 gallons at one time. The entire operation is monitored from a master control panel that automatically sets the chlorine level for the water and determines correct pH. Two huge 20,000-gallon fiberglass tanks are fed by four smaller fiberglass working tanks of 10,000 gallons each where chemical treatment and filtration are used to clean the water. Dye is removed, and phosphate is retained. The entire treatment process requires only four minutes, with another five to six minutes being required to feed the four tanks. Due to the short time needed for dye water to pass through the system, the cleansed water re-enters the dyehouse at relatively high temperatures, thereby reducing fuel consumption and costs for heating dye water by as much as 45%. (Kreager-FIRL)
W77-00759

INFLUENCE OF SIZING AGENTS AND PRINTING THICKENERS ON BIO-CHEMICAL WATER PURIFICATION,
Scholten-Honig Research B. V., Foxhol (Netherlands).
P. J. A. Beersma.
Water and Waste Treatment, Vol. 19, No. 6, p 36, June, 1976. 1 tab.

Descriptors: *Textiles, *Waste water treatment, *Chemical oxygen demand, *Biochemical oxygen demand, *Water purification, Binders, Polymers, Oxidation, Oxygen demand, Alcohols, Organic compounds, Chemical wastes, Colloids, *Biological treatment.
Identifiers: Sodium alginate, Starch derivatives, Polyvinyl alcohols, Polyacrylates, Synthetic polymers, Thickeners, Textile industry.

The influence of colloidal substances which are used in textile sizing (binding agents) and printing (thickeners) on the purification of effluent water is discussed. For the total oxidation (chemical oxygen demand) of most starch derivatives, 110-130 milligrams of oxygen per 100 milligrams of dry product are required. The same applied to derivatives of cellulose and guar gum. Synthetic products such as polyvinyl alcohol and polyacrylates require more oxygen for complete oxidation. Sodium alginate compounds require relatively little oxygen in comparison with the above compounds. A comparison of the 5-day biochemical oxygen demand values of various binding agents and thickener reveals that natural products which degrade easily have much higher biochemical oxygen demand values than synthetic polymers. (Kreager-FIRL)
W77-00760

REMOVING IRON FROM ACID WASTE LIQUIDS BY OXIDATION - AT CONTROLLED PH BY ADDITION OF BASE, GIVING EASILY SEPARATED PRECIPITATION FOR LARGE-SCALE USE.
French Patent FR 2284-568. Issued May 14, 1976. Derwent French Patents Abstracts, Vol. X, No. 26, p D2, April 9, 1976.

Descriptors: *Patents, *Iron compounds, *Waste water treatment, *Oxidation, *Chemical precipitation, Industrial wastes, Chemical wastes, Filtration, Separation techniques, Acids, Ions, Oxides.
Identifiers: Metals industries.

A patent for a method to remove iron from acid wastes generated during the etching of iron particles or during the production of titanium dioxide is described. The process involves the oxidation of acid waste liquids containing ferrous ions at a temperature of 50-75C and a pH between 3.5-5.2 by the addition of a base which results in the formation of a precipitate containing multicrystal agglomerated particles of an iron compound. The base claimed in the present patent is ammonia, although other bases such as hydroxides of potassium, magnesium, or calcium may be used. The precipitate is filtered off, giving a clear, almost neutral liquid. The large iron-containing particles are removed as iron oxide and iron peroxide by filtration; the ferromagnetic iron oxide may Alternatively be separated in a magnetic field. The oxidation is caused by blowing air into the waste liquid, and ammonia is added to the air stream. The oxidation is continued until the pH suddenly rises to about 7. (Kreager-FIRL)
W77-00761

QUATERNARY AMMONIUM SALTS CONTROL ODORS,
For primary bibliographic entry see Field 5G.
W77-00762

WHY INDUSTRIAL WASTEWATER PRETREATMENT,
W. M. Throop.
Industrial Wastes, Vol. 22, No. 4, p 32-33, July/August, 1976.

Descriptors: *Chemical wastes, *Industrial wastes, *Sewerage, *Legislation, *Municipal wastes, Permits, Cities, Waste water treatment, Federal Water Pollution Control Act, Flow, Biochemical oxygen demand, Suspended solids, Loans, Federal government, Local governments, Standards, Toxicity.

Requirements of the Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500, regarding the pretreatment of industrial wastes introduced into municipal systems are reviewed.

The pretreatment sections of the Act are intended to prevent the introduction of pollutants which interfere with, pass through, or are otherwise incompatible with the treatment of liquid wastes in municipal treatment plants. Under the law, a municipality must obtain a permit under the National Pollution Discharge Elimination System, and no effluent for which a permit has been issued may exceed the effluent standards and limitations set forth in the permit. User charges, as assessed under Section 204 (b) of Public Law 92-500, are generally graduated on the basis of flow, biochemical oxygen demand, and suspended solids of liquid wastes. Substances which are usually excluded from municipal systems are those which restrict hydraulic capacity, cause chemical or mechanical erosion of the sewerage system, endanger public health, or produce conditions obnoxious to the public interest. The Environmental Protection Agency has published a list of toxic materials which will be limited or excluded from industrial waste discharges to municipal systems. The Agency has also instituted a loan program for small businesses needing capital to meet water pollution control requirements. (Kreager-FIRL)
W77-00763

EFFLUENT TREATMENT IN THE PAINT AND SURFACE COATING MANUFACTURING INDUSTRY,
M. L. Hemming.
Paint Manufacture, Vol. 46, No. 6, p 8-13, 29, June, 1976. 2 fig, 1 tab.

Descriptors: *Chemical industry, *Waste water treatment, *Paint, *Industrial wastes, *Sludge treatment, Effluents, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Metals, Flocculation, Biological treatment, Filtration, Sedimentation, Coagulation, Flotation, Chemical wastes.
Identifiers: Paint manufacturing industry.

Effluents generated by paint manufacturing plants are described along with methods for their treatment. Typical values for effluent chemical oxygen demand, biochemical oxygen demand, suspended solids, chromium, zinc, lead, antimony, tin, and iron are: 6200, 4200, 700-2000, 0.2, 6.0, 3.0, 5.0, 10.0, and 20 milligrams/liter, respectively. Treatment options for purifying paint manufacturer effluents include: coagulation, flocculation, sedimentation, flotation, microflotation, and biological treatment (activated sludge or biological filtration). The use of chemical flocculation and sedimentation or flotation can be expected to remove about 80% of the suspended solids and about 50% of the biochemical oxygen demand and chemical oxygen demand in mixed effluent from paint manufacturing operations. Additional purification required for discharge to a water course is accomplished by biological treatment. The resulting sludge generated from effluent treatment generally has a solids content in the range of 1-3% and can be concentrated up to about 25% (by weight) using mechanical dewatering. (Kreager-FIRL)
W77-00764

EVAPORATION AND THERMAL OXIDATION OF LIQUID EFFLUENTS - BY BURNING WITH FLAME IN COMBUSTION CHAMBER.
Belgian Patent BE-838-608. Issued June 16, 1976. Derwent Belgian Patents Abstracts, Vol. X, No. 29, p D2, 1976.

Descriptors: *Patents, *Chemical wastes, *Waste water treatment, *Evaporation, *Incineration, Industrial wastes, *Oxidation, Liquid wastes, Solid wastes, Equipment, Design criteria, Chemical industry, Toxicity.
Identifiers: Thermal oxidation.

A patent for a process designed to achieve evaporation and thermal oxidation of liquid effluents containing toxic products generated from industrial operations such as refineries, paper mills, color manufacturers, and petrochemical plants is described. The apparatus used for continuous evaporation and thermal oxidation of the wastes includes a central conduit for conveying effluent which is sprayed at an outlet to produce a liquid jet, an annular conduit surrounding the central conduit which is fed with a fuel gas and is pierced with orifices which open into a pipe surrounding the annular conduit, and a turbine which causes combustion air to rotate by its own kinetic energy before reaching the fuel. The resulting flame has a divergent shape and is spatially distinct from the liquid jet. The flame vaporizes the effluent by convection currents in the combustion chamber. In addition to treating the products in the liquid effluent, the apparatus can also be used to burn solid wastes as a result of their admixture with the fuel. A stable flame can be obtained by making use of the blown secondary air employed for spraying the effluent. (Kreager-FIRL)
W77-00765

OPTIMIZE THE EFFLUENT SYSTEM - PART 5: MULTI-MEDIA FILTERS,
J. F. Grutsch, and R. C. Mallatt.
Hydrocarbon Processing, Vol. 55, No. 7, p 113-118, July, 1976. 8 fig, 5 tab, 2 ref.

Descriptors: *Filtration, *Waste water treatment, *Oil industry, *Effluents, *Separation techniques, Suspended solids, Activated sludge, Lagoons, Aeration, Biological treatment, Industrial wastes, *Filters.
Identifiers: Mulit-media filters.

The use of multi-media filtration for the treatment of refinery effluents is discussed. Topics discussed include: filtration mechanisms, chemical pretreatment for direct filtration, refinery make-up water clarification, filtration of API separator effluents, filtration of aerated lagoon effluents, filter unloading, and filter failure. Direct filtration for phase separation is cited as a key element in end-of-the-pipe treatment sequences for the removal of suspended matter to levels that permit optimization of activated sludge processes. Determining the proper chemical pretreatment to destabilize suspended matter prior to filration is the key to sucess in applying filtration. Direct filtration is also applicable to intake water, effluents from secondary treatment, and essentially all phase separation problems if destabilization chemistry is addressed. (Kreager-FIRL)
W77-00766

PRECIPITATION OF PHOSPHATE FROM SOLUTION USING ALUMINUM SALT,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
P. H. Hsu.
Water Research, Vol. 9, No. 12, p 1155-1161, December 1975. 8 fig, 5 tab, 1 equ, 18 ref. OWRT A-042-NJ(1).

Descriptors: *Phosphates, *Chemical precipitation, Water quality, *Waste water treatment, Salts, Hydrogen ion concentration.
Identifiers: *Aluminum salts.

In the absence of any interfering component, the optimum pH range and the effectiveness of aluminum phosphate precipitation were found to vary with the initial ratio of phosphate to aluminum in sample preparation. Phosphate was almost completely removed from solution when aluminum was in large excess. At maximum, 1 mole of phosphate was precipitated by 1 mole of aluminum, but this occurred only when phosphate was in large excess. (Skogerboe-Colo St)
W77-00871

REMOVAL OF ORGANICS FROM WATER,
Permutit-Boby, Ltd., London (England).
M. C. Rowe.
Effluent and Water Treatment Journal, Vol. 6, No. 47, p. 519-522, 1975. 5 fig., 2 tab., 4 ref.

Descriptors: *Waste water treatment, *Water softening, *Organic wastes, *Resins, *Ion exchange, Cellulose, Fouling, Humic acids, Adsorption, Byproducts, Organic acids, Phenols, Industrial water, *Industrial wastes.
Identifiers: Viscose resins, Polystyrene resins, Acrylic resins.

A weak base macroporous viscose (regenerated cellulose) exchanger which was hydrophilic and reduced 'fouling' caused by irreversible adsorption of humic acids was compared with a strong base polystyrene macroporous resin and a weak base acrylic 'gel' resin. Its adsorption and desorption efficiencies were higher. Viscose resins could, by running ahead of the polystyrene resins, reduce the organic load induced during high runoff. Use of the two resins in series would save space and labor, could be automated, would not be susceptible to high organic breakthrough, and would reduce humic acids more. With acidic brewery condensates, high molecular weight acids slipped the polystyrene resin. Acrylic resins adsorbed low molecular weight organic acids better. Viscose resins adsorbed slippage from the polystyrene resin; they had a high capacity for proteins and high molecular weight organic acids and gave better desorption of large organic acids. Polystyrene resin capacity was lowered with increasing molecular weights; some neutral phenolic materials were adsorbed. This method permits removal of organic material from water and process streams over the whole molecular weight range. The regenerant can be evaporated and the ammonium salts of the organic acids crystallised and recovered. The ammonia driven off in the evaporation can be trapped and reused, and the ammonium acid salts used as an animal feed supplement. (Buchanan-Davidson--Wisconsin)
W77-00924

MUNICIPAL PHOSPHORUS LOADINGS TO LAKE ERIE, AN EVALUATION STUDY PREPARED FOR THE GREAT LAKES WATER QUALITY BOARD.
International Joint Commission-United States and Canada, Windsor (Ontario). Great Lakes Water Quality Board.
For primary bibliographic entry see Field 5B.
W77-00926

WATER POLLUTION INVESTIGATION: BLACK RIVER OF NEW YORK.
Hydroscience, Inc., Westwood, N. J.
For primary bibliographic entry see Field 5B.
W77-00929

DETOXIFYING INDUSTRIAL WASTEWATERS.
Environmental Science and Technology, Vol 10, No 2, p 127-29, Feb 1976. 3 p, 1 map, 3 photo, 1 chart.

Descriptors: *Toxins, *Water pollution control, *Treatment facilities, *Industrial wastes, *Water pollution treatment, Water pollution sources, Water policy, Monitoring, Water resources, Treatment, Pollutants, Waste treatment, Water treatment, Sewage treatment, Chemical wastes, Oil wastes, Sludge, *Waste water treatment.

Systematic toxic waste disposal has become an increasing problem in recent years. Because of treatment complexity, troublesome sequestering, and cost factors, many industrialized firms are not in a position to build detoxification plants that meet anti-pollution requirements. Regional treatment centers offer a solution to this problem. These centers accept almost all inorganic materials and solutions. Such materials are delivered in plastic cylinders to the center where they are transferred to large storage tanks. The storage tanks are divided into eleven sections which are classified as to the

materials received. The solutions then undergo several chemical processes that are described in detail. Some of the processes include reprecipitation, decontamination of cyanide, and ion-exchanger regeneration. The treatment charges for this process, which are fixed by the center's board of directors, are considerably cheaper than individual treatment. If these centers are fully utilized, water pollution by toxic solutions can be considerably abated since companies will no longer have to dump the solutions into streams. (Hoffman-Florida)
W77-00965

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM AND STATE PROGRAM ELEMENTS NECESSARY FOR PARTICIPATION.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-00986

5E. Ultimate Disposal Of Wastes

DEFUSING THE SEWAGE STINKBOMB ON THE TYNE.
For primary bibliographic entry see Field 5D.
W77-00559

METHOD FOR IMPROVING SEWAGE SLUDGE INCINERATION,
Nalco Chemical Co. Oak Brook, Ill. (Assignee).
G. Flynn.
United States Patent 3,974,783. Issued August 17, 1976. Official Gazette of the United States Patent Office, Vol. 949, No. 3, p 951, August 1976.

Descriptors: *Patents, *Sewage sludge, *Sludge treatment, *Sludge disposal, *Incineration, Temperature, Magnesium compounds, Metals, Waste treatment, Solid wastes, Carbon, Burning.
Identifiers: Combustion.

A patent for a method that improves sewage sludge incineration by lowering the ignition temperature of carbon is described. The method involves burning the sewage sludge in the presence of between 50-8000 ppm by weight (based on dry sewage sludge) of an additive consisting of a metal compound and a magnesium compound. The metal compound may contain copper, cobalt, manganese, iron, or calcium. The magnesium compound may be either magnesium oxide or any magnesium compound which decomposes to magnesium oxide under combustion conditions. The weight ratio of the magnesium compound (expressed as Mg) to the metal compound (expressed as said metal) is between the range of 5:1 to 35:1. (Kreager-FIRL)
W77-00576

INTERACTIONS BETWEEN SLUDGE CONDITIONING, VACUUM FILTRATION, AND INCINERATION,
Minnesota Univ., Minneapolis. Dept. of Civil and Mineral Engineering.
For primary bibliographic entry see Field 5D.
W77-00580

SOFT WATER CAN MEAN HARD DISPOSAL PROBLEMS,
Williams (Clyde E.) and Associates, Inc., South Bend, Ind.
H. F. Zinsmeister, and J. N. Ramaswamy.
American City and County, Vol. 91, No. 8, p 47-48, August, 1976. 2 fig, 2 tab.

Descriptors: *Zeolites, *Water softening, *Waste disposal, *Waste treatment, *Brine disposal, Chlorides, Sodium compounds, Calcium compounds, Magnesium compounds, Reverse osmosis, Electrodialysis, Lagoons, Recycling, Water treatment, Costs.
Identifiers: Holding tanks.

Problems associated with the disposal of brine wastes generated by zeolite softening units are discussed. These wastes contain chloride ions (principally from sodium, calcium, and magnesium compounds) proportional to the amount of salt used in the regeneration of the zeolite. Disposal techniques usually focus on keeping these brines out of local streams since high concentrations of the chlorides formed during the regeneration process can be harmful to both aquatic life and livestock. If limiting values for the constitutents of zeolite wastes are known for a given stream, the flow necessary to dilute the wastes may be estimated. Volume reduction of the brine waste by utilizing the regenerative capacity of the brine is a good treatment method. By returning brine normally exhausted during the regeneration cycle to the brine storage tank, the discharge and treatment of the waste can be reduced by about two-thirds. Estimated waste disposal costs are tabulated for the following treatment methods discussed: reverse osmosis, electrodialysis, lagoon (annual discharge), holding tank with steady discharge, and holding tank (20 years). (Kreager-FIRL)
W77-00589

IRRIGATION OF CORN WITH SIMULATED MUNICIPAL SEWAGE EFFLUENT,
Michigan State Univ., East Lansing. Agricultural Experiment Station; and Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
D. L. Karlen, M. L. Vitosh, and R. J. Kunze.
Journal of Environmental Quality, Vol. 5, No. 3, p 269-273, July-September, 1976. 4 fig, 6 tab, 25 ref.

Descriptors: *Irrigation effects, *Municipal wastes, *Sewage disposal, *Nutrient removal, Nitrogen, Potassium, Sodium, Plant growth, *Corn(Field), Laom, Denitrification.

A field study designed to evaluate the effects of applying 25, 50, 100, and 200 cm of simulated municipal sewage effluent to corn grown on a tile-drained loam soil was conducted. The results indicated that if effluents which are low in potassium and high in sodium are to be renovated through land disposal supplemental potassium must be applied. The experiment also demonstrated that the annual loading rate on a tile-drained Conover loam should not exceed 100 cm of supplemental effluent if efficient utilization of the applied nutrients through plant uptake is to be achieved. Nitrogen recovery through plant uptake at the 25-, 50-, and 100-centimeter loading rates exceeded 40% of the nitrogen applied through effluent and starter fertilizer when the corn was harvested as silage. Nitrogen uptake in the grain at these loading rates exceeded 50% in 1973 but was much lower the following year. The distribution of NO3 and C1 and the C1/NO3 ratios suggested that much of the unrecovered nitrogen was denitrified. (Kreager-FIRL)
W77-00610

HYDROGEN SULFIDE IN BOTTOM WATER NEAR A SEWAGE SLUDGE DUMPING SITE,
Brookhaven National Lab., Upton, N.Y. Dept. of Applied Science.
For primary bibliographic entry see Field 5A.
W77-00620

DEMONSTRATION OF A PLANNING PERSPECTIVE FOR WASTE WATER SLUDGE DISPOSITION.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 684, $7.50 in paper copy, $3.00 in microfiche. Report EPA-440M-76-001-b (WPD 01-76-01), January 1976. 183 p, 12 fig, 24 tab, 60 ref, 4 append.

Descriptors: *Waste water treatment, Analytical techniques, *Treatment facilities, *Planning, *Sludge disposal, Sludge, Waste disposal, Management, Project planning, Cost analysis, Reclamation, Industrial wastes, Sewage treatment, Water pollution, Ohio, Kentucky, Indiana.

Waste water treatment and sludge disposal methods of plants in the Ohio-Kentucky-Indiana region were investigated to test an application of a methodology previously developed by the Environmental Protection Agency. Fifteen of the area's 158 waste water treatment facilities and 3 proposed facilities were selected for evaluation. The sample plants were surveyed by on-site inspection and analysis of available records. Background information is included such as the region's economic and institutional characteristics and environmental setting, current waste water treatment and sludge management practices, and applicable air and water quality and land use regulations. In application of the methodology, various sludge management alternatives are analyzed in terms of technical feasibility, costs, environmental impacts, sociopolitical implications, and other factors. Each facility is analyzed based on volumes of sludge generated, characteristics of the sludge, and current sludge disposal methods. Suitable sludge disposal alternatives are identified. Except for the various disposal methods currently being practiced by each waste water treatment plant, wet land spreading appears to be the most universally applicable sludge disposal method. Four alternatives are presented for regional sludge management systems, all involving four centralized processing facilities with sludge dewatering capabilities. The dewatered sludge would be disposed of in a regional landfill site, a reclamation site, suitable agricultural land, or by incineration. (Snyder-FIRL)
W77-00631

EXPERIMENTS TO INVESTIGATE SUBSTANTIAL LOAD OF SOILS AND TO PREDICT THE LONG TERM EFFECTS OF WASTES ON GROUND WATER, (IN GERMAN),
Ministry of Agricultural Experiment Station, Brunswick (West Germany).
For primary bibliographic entry see Field 5B.
W77-00703

A MODEL OF RECYCLING AND POLLUTION CONTROL,
Florida Univ., Gainesville. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W77-00711

THE EFFLUENT TREATMENT PLANT OF BASF AG IN LUDWIGSHAFEN/RHINE,
Badische Anilin- und Soda-Fabrik A.G., Ludwigshafen am Rhein (West Germany).
For primary bibliographic entry see Field 5D.
W77-00742

A SYSTEMS APPROACH TO THE ECONOMICS OF WASTE HANDLING,
Aston Univ., Birmingham (England). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W77-00745

EVAPORATION AND THERMAL OXIDATION OF LIQUID EFFLUENTS - BY BURNING WITH FLAME IN COMBUSTION CHAMBER.
For primary bibliographic entry see Field 5D.
W77-00765

REPORT TO THE CONGRESS ON OCEAN DUMPING RESEARCH, JANUARY THROUGH DECEMBER 1975.
National Oceanic and Atmospheric Administration, Washington, DC.
For primary bibliographic entry see Field 5G.

W77-00892

OCEAN DUMPING; PROPOSED SITE DESIGNATION.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-00985

IT'S TIME TO STOP KILLING THE OCEAN,
National Wildlife Federation, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-01046

5F. Water Treatment and Quality Alteration

SUBSTANTIATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF NIOBIUM IN WATER BODIES, (IN RUSSIAN),
Institut Gigieny Truda i Profzabolovsk (USSR).
For primary bibliographic entry see Field 5C.
W77-00529

UTILIZATION OF ALUMIZED RED MUD SOLIDS FOR PHOSPHORUS REMOVAL,
Black, Crow and Eidsness, Inc., Gainesville, Fla. Process Design Dept.
For primary bibliographic entry see Field 5D.
W77-00587

CARBON ADSORPTION OF AIR AND WATER POLLUTANTS,
P. N. Cheremisinoff.
Pollution Engineering, Vol 8, No 7, p 24-32, July, 1976. 5 fig, 1 tab.

Descriptors: *Water treatment, *Activated carbon, *Adsorption, *Water purification, *Organic compounds, *Waste water treatment, Treatment facilities, Equipment, Filtration, Economics, Design criteria, Municipal wastes, Industrial wastes.
Identifiers: *Carbon adsorption.

The use of carbon adsorption for the removal of organic compounds from water is discussed. Carbon adsorption systems are of two types, regenerative and nonregenerative. For operations in which daily carbon requirements are large or under constant use, granular carbons offer the advantage of established methods of regeneration which greatly reduce costs and are suited to continuous column design service. Powdered carbons offer advantages in applications where the daily carbon requirements may not be large enough to warrant the installation and operation of regeneration equipment. Adsorption studies with carbon indicate that most of the Environmental Protection Agency-proposed dissolved organic toxic chemicals can be removed from water by activated carbon. Adsorption treatment equipment can consist of adsorbers holding granular activated carbon beds or mixed media filters. Granular carbon is primarily used as a post-filtration adsorption system and is generally limited to large municipal plants and industrial water treatment applications. The powdered form is more commonly used in municipal water plants and requires less capital investment. (Kreager-FIRL)
W77-00591

REGULATIONS: REACTIONS AND RESOLUTION,
Environmental Protection Agency, Washington, D. C., Office of Water and Hazardous Materials.
For primary bibliographic entry see Field 5G.
W77-00615

SCALE INHIBITION AND COMPOUNDS THEREFORE,
Nalco Chemical Co., Oak Brook, Ill. (Assignee).
J. R. Stanford, and P. G. Vogelsang, Jr.
U.S. Patent No. 3,965,003, 6 p, 8 ref; Official Gazette of the United States Patent Office, Vol 947, No 4 p 1724, June 22, 1976.

Descriptors: *Patents, *Water treatment, *Water softening, *Scaling, Hardness(Water), Chemical reactions, Water quality.
Identifiers: *Scale inhibitors, Phosphated oxypropylated amines.

It has been found that phosphated oxypropylated amines and/or phosphated oxypropylated hydroxy hydrocarbons, with or without neutralization, are effective scale inhibitors in inhibiting scale deposits from water containing scaleforming chemicals. The phosphated oxypropylated amine is introduced into hard water or brine which is usually contacted with metal or other solid surfaces while maintaining a hardness-ion-precipitation-preventing quantity in the order of 0.5 per 100 parts per million (ppm) of the active effective compound. (Sinha-OEIS)
W77-00686

PORTABLE WATER STERILIZATION DEVICE,
G. C. Dawson.
U. S. Patent No 3,965,008, 4 p, 5 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 947, No 4, p 1726, June 22, 1976.

Descriptors: *Patents, *Water treatment, *Water purification, *Water pollution treatment, Water pollution control, Water quality control, *Potable water, Bacteria, Electrodes, Electrolysis, Equipment.
Identifiers: Portable equipment.

A light weight portable device is used for sterilizing water containing harmful bacteria. The components of the device are removably connected to one another, and may be separated and stored in a compact arrangement if the device is not in use. The device is particularly adapted for supplying potable water from contaminated water in areas that have been subjected to a disaster such as a flood, earthquake or the like. The components of the device may be readily assembled into a usable unit by persons having little or no mechanical skill. The invention includes a tank in which contaminated water may be placed. Two laterally spaced, oppositely disposed, elongate electrodes are situated within an L-shaped tubular member. Two terminals are provided for supplying alternating electric power to the electrodes at a voltage potential sufficient to kill harmful bacteria in the contaminated water which flows by gravity between the electrodes. (Sinha-OEIS)
W77-00688

ARTIFICIAL RECHARGE IN THE GRAND PRAIRIE, ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4B.
W77-00734

5G. Water Quality Control

ISSUES RELATED TO INTERFACING WATER RESOURCE PLANNING WITH LAND USE PLANNING: DEVELOPMENT AND APPLICATION OF QUANTITATIVE PROCEDURES,
INTASA, Menlo Park, Calif.
For primary bibliographic entry see Field 6B.
W77-00526

ENERGY, WATER, AND THE WEST,
American Association for the Advancement of Science, Washington, D. C.
For primary bibliographic entry see Field 6D.
W77-00542

AGRICULTURAL AND ENVIRONMENTAL IMPACTS AS A RESULT OF INCREASED DEMANDS FOR ENERGY DEVELOPMENT,
For primary bibliographic entry see Field 6D.
W77-00545

DON'T WASTE WATERWEEDS,
National Space Technology Labs., Bay St. Louis, Miss.
For primary bibliographic entry see Field 5D.
W77-00592

WASTEWATER RECYCLING ALONG TRANSPORTATION CORRIDORS,
Black, Crow and Eidsness, Inc., Clearwater, Fla.
L. A. Dove, and E. G. Rivers.
Transportation Research Record, No. 571, p 28-35, 1976. 6 ref.

Descriptors: *Waste water, *Water reuse, *Irrigation, *Transportation, *Institutional constraints, Reclaimed water, *Recycling, Florida, Cities, Reclamation, Nutrients, Feasibility studies, Florida.
Identifiers: Saint Petersburg(Fla).

The feasibility and desirability of irrigating green spaces along transportation corridors with highly treated waste water is discussed, with particular reference to a zero-discharge, total-recycling waste water system for the city of Saint Petersburg, Florida. The system produces a virus-free waste water effluent that retains the valuable nutrients essential to plant growth. It is demonstrated that policies of the American Association of State Highway and Transportation Officials and Federal and state governments have established at least a permissive attitude on the use of treated waste water for irrigation of transportation corridors. Research on utility-accommodation policies and practices as well as on the feasibility and health effects of waste water recycling along transportation corridors is recommended. Applications involving the reuse of treated waste water for land disposal throughout the United States are reviewed. (Kreager-FIRL)
W77-00611

REGULATIONS: REACTIONS AND RESOLUTION,
Environmental Protection Agency, Washington, D. C., Office of Water and Hazardous Materials.
A. W. Breidenbach.
American Water Works Association Journal, Vol. 68, No. 2, p 77-82, February, 1976. 1 tab.

Descriptors: *Legislation, *Potable water, *Regulation, *Water quality control, *Safety factors, Economics, Federal government, Monitoring, Quality control, Public health, Consumptive use, Water requirements.
Identifiers: *Safe Drinking Water Act, Interim primary drinking-water regulations, Environmental Protection Agency.

The Interim Primary Drinking-Water Regulations established by the Environmental Protection Agency in accordance with the Safe Drinking Water Act are discussed in terms of their development and objectives. Specific topics covered include: the applicability of the regulations to different types of public water systems, provisions in the regulations for sanitary surveys, the establishment of maximum contaminant levels, proposed requirements for measuring contaminant levels, the importance of quality assurance and record keeping procedures in relation to making the regulations effective, public comments received by the Agency concerning the regulations and proposed requirements, and the economic impact of the regulations. Total investment costs to community

water systems in compliance with the regulations are estimated to be between $1.1 and $1.8 million. Noncommunity systems are expected to invest an additional $24 million. (Kreager-FIRL)
W77-00615

DEMONSTRATION OF A PLANNING PERSPECTIVE FOR WASTE WATER SLUDGE DISPOSITION KNOXVILLE/KNOX COUNTY,
Environmental Protection Agency, Washington, D.C., Water Planning Div.
For primary bibliographic entry see Field 5D.
W77-00626

INSPECTION MANUAL FOR THE ENFORCEMENT OF NEW SOURCE PERFORMANCE STANDARDS: SEWAGE SLUDGE INCINERATORS,
PEDCo-Environmental, Inc., Cincinnati, Ohio.
T. W. Devitt, and N. J. Kulujian.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 112, $5.00 in paper copy, $3.00 in microfiche. Report EPA 340/1-75-004, February, 1975. 73 p, 2 fig, 6 tab, 14 ref, 3 append.

Descriptors: *Waste water treatment, *Pollutant identification, *Analytical techniques, *Treatment facilities, *Sewage treatment, Incineration, Air pollution, Control, Inspection, Performance, Testing procedures, On-site tests, *Water quality standards.
Identifiers: Air pollution control.

Guidelines are presented for field inspections to determine whether new or modified sewage sludge incinerators comply with New Source Performance Standards (NSPS). These are particulate emission and opacity standards for incinerators burning sludge produced by municipal waste water treatment facilities. Key parameters identified during the performance test are used for comparison during subsequent inspections to determine the facility's compliance status. Descriptions of the sewage sludge incineration process, atmospheric emissions from these processes, and emission control methods are included. A detailed discussion of the inspection methods and types of records to be kept is also provided. A survey of emission limitations in state implementation plans is presented. (Snyder-FIRL)
W77-00627

WASTEWATER RECLAMATION PROJECT, ST. CROIX, U.S. VIRGIN ISLANDS,
Black, Crow and Eidsness, Inc. Gainesville, Fla.
For primary bibliographic entry see Field 5D.
W77-00630

COMPUTERIZED CITY-WIDE CONTROL OF URBAN STORMWATER,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg, J. W. Labadie, G. R. Trimble, and D. A. Wismer.
American Society of Civil Engineers, New York, NY, Urban Water Resources Research Program, Technical Memorandum No. 29, February 1976. 81 p, 22 fig, 5 tab, 52 ref, append. NSF GI38465.

Descriptors: *Control systems, *Sewers, *Storm runoff, *Overflow, *Optimization, *Information retrieval, Water pollution control, Storage, Detention, Reservoir operation, Mathematical models, *Dynamic programming, Systems analysis, Automatic control, Combined sewers.
Identifiers: *Combined sewer systems, Mathematical programming, Optimal control theory, Control logic, Urban water systems.

Automatic computer control has been applied in industry for over 15 years. The soft and hard technology developed thereby can be applied to control city-wide stormwater and combined sewer systems. Drainage patterns of urban catchments fit into a framework that suggests hierarchical control by minicomputers. Considerable opportunities for productivity improvement exist using such an approach to automatic control. At the same time, the hurdles to successful automation projects should not be minimized. There are at least five separate categories of models needed and the effectiveness of automation strategies is closely connected to the success of the mathematical models adopted. Total automatic control should be implemented in an evolutionary procedure reaching the closed-loop phase only after carefully completing the data logging, remote supervisory and computer assisted control phases. The decomposition approach to control fits naturally with the morphology of urban catchments and the emergence of hierarchical computer control systems. This approach seems most promising for overcoming the complexities to city-wide systems. (McPherson-ASCE)
W77-00634

TOXICITY OF PARAQUAT TO PARACALLIOPE FLUVIATILIS (AMPHIPODA),
Canterbury Univ., Christchurch (New Zealand). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W77-00666

IMPROVING THE QUALITY OF WATER RELEASES FROM RESERVOIRS BY MEANS OF A LARGE DIAMETER PUMP,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W77-00668

DEMONSTRATION OF WATER QUALITY ENHANCEMENT THROUGH THE USE OF THE GARTON PUMP,
Oklahoma Water Resources Research Inst. Stillwater.
J. E. Garton, and H. R. Jarrell.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 601, Price codes: A02 in paper copy, A01 in microfiche. d Supplement to Completion Report, (1976). 21 p, 10 fig, 3 tab, append. OWRT C-5228 (No. 4215)(2).

Descriptors: Water quality, Lakes, *Pumps, *Pumping, *Stratification, Epilimnion, Thermocline, Hypolimnion, *Destratification, *Mississippi, Reservoir releases, Reservoir operation.
Identifiers: *Lake Okatibbee(Miss), *Garton pump.

In temperate climates, many lakes stratify during the summer. A typical stratified lake will have a warm oxygen-rich epilimnion, a thermocline, and a colder oxygen depleted hypolimnion. High levels of iron, manganese, hydrogen sulfide, and ammonia and dissolved hydrocarbons may occur in the hypolimnion. Many efforts have been made to destratify lakes, primarily by air bubbling. These methods require large energy inputs. A low-energy destratifier using a 1.83 m propeller to pump water downward from the surface has been used successfully to destratify a 100 acre lake (35 feet deep) for three years. This project involved using the pump on Lake Okatibbee, a broad, shallow lake of approximately 1537 ha (3800 Ac) with a maximum depth of slightly over ten meters. Its volume is approximately 5.2 x 10 m (42000 ac. ft.) At Lake Okatibbee the pump was placed over the intake structure, which contains the deepest waters of the lake, in an effort to enhance the quality of water relased from a low level outlet. From the data obtained it is evident that the Garton Pump can indeed induce water from the epilimnion to flow downward into the intake structure so that the water actually released has the characteristics of the near surface water of the lake. (See also W77-00668)
W77-00669

URBAN FLOOD WARNING AND WATERSHED MANAGEMENT ADVANCES IN METROPOLITAN MELBOURNE,
Melbourne and Metropolitan Board of Works. (Australia).
For primary bibliographic entry see Field 6F.
W77-00670

MEASUREMENT OF URBAN RUNOFF PETROLEUM,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Environmental Science.
For primary bibliographic entry see Field 5B.
W77-00678

SPORT FISHERIES AND OFFSHORE OIL,
New York State Dept. of Environmental Conservation, Delmar. Div. of Marine and Coastal Resources.
For primary bibliographic entry see Field 6G.
W77-00680

PROCESS FOR REMOVING DISPERSED MATTER FROM WATER,
Exxon Research and Engineering., Co., Linden, N. J. (Assignee).
C. A. Irani, and D. J. McHugh.
U.S. Patent No. 3,965,001, 5 p, 4 tab, 6 ref; Official Gazette of the United States Patent Office, Vol 947, No 4, p 1723, June 22, 1976.

Descriptors: *Patents, *Oil pollution, *Oily water, *Water pollution control, Water quality control, *Separation techniques, Sea water, Adsorption, Hydrogen ion concentration, Salinity.
Identifiers: Ballast water, Flocculated salts.

A process for separating dispersed matter from water consists of adding a flocculated salt selected from the group consisting of aluminum, iron and Group IIA of the Periodic Table of Elements and additional oil. The salts adsorb the dispersed matter and oil and are separated from the water by precipitating the salts by adjusting the pH. The process is useful for the removal of petrolium oils from sea water such as ballast water. The preferred flocculated salts are magnesium hydroxide, strontium carbonate, and calcium carbonate. The flocculated salt is stirred with the water phase for about 1 to 30 minutes to substantially adsorbe the dispersed matter. When agitation is discontinued the oil, along with the flocculated salt and dispersed matter will rise to the surface where it can be collected. Oxides or hydroxides of calcium are preferred basic materials for adjusting the pH of sea water. Furthermore, the calcium salts themselves will not generally detract from the quality of the water which is returned to the sea after treatment. (Sinha-OEIS)
W77-00684

PROCESS FOR REDUCING DISSOLVED INORGANIC ORTHOPHOSPHATES TO PPB LEVELS IN AQUEOUS SYSTEMS,
Betz Labs., Inc., Trevose, P. (Assignee).
L. B. Magnusson.
U. S. Patent No. 3,965,002, 8 p, 4 fig, 1 tab, 2 ref; Official Gazette of the United States Patent Office, Vol 947, No 4, p 1723-1724, June 22, 1976.

Descriptors: *Patents, *Water treatment, *Water quality control, *Water pollution control, *Separation techniques, Phosphates, Chemical precipitation, Chemical reactions, Waste water treatment, Water reuse.
Identifiers: Calcium phosphate, *Orthophosphates.

A process is described for the economical, large scale removal of soluble phosphates from supply, waste or reusable waters. A slurry of seed crystals of calcium phosphate, formed under critical conditions, is introduced into a reactor region. The phosphate-containing water is fed into the region

under certain conditions of pH and calcium content, and the dissolved phosphates are precipitated at a rate equal to the feed rate so that the residual dissolved phosphorus level of the treated water is below 50 parts per billion. The pH of the water is maintained between 8.5 and 9.5 and the temperature of the water is maintained at or below 30C. (Sinha-OEIS)
W77-00685

REMOVAL OF CONTAMINANTS FROM WATER,
Sun Shipbuilding and Dry Dock Co., Chester, Pa., (Assignee)
D. C. Garber.
U. S. Patent No. 3,965,004, 8 p, 5 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 947, No 4, p 1724, June 22, 1976.

Descriptors: *Patents, *Oil pollution, *Oily water, *Water pollution treatment, *Separation techniques, Water quality control, Suspended solids, Coalescence.
Identifiers: Ballast water, Ceramic pellets.

The oily water such as ballast from oil tankers, is first passed through an oil-water separator such as a gravity--type which provides a rough separation of the oil and water. The effluent from this unit is pumped through a ceramic dewaxer containing porous ceramic pellets. Waxes, asphalts, gums, and similar materials in the separator effluent (influent for the dewaxer) impinge upon and are retained by these pellets, which may be regenerated when necessary. Effluent from the dewaxer is passed through a sand filter to remove particulate matter and then through a coalescer, which coalesces the remaining oil droplets to complete the oil-water separation. (Sinha-OEIS)
W77-00687

INFANT MORTALITY AND WATER HARDNESS IN THE UNITED STATES,
National Inst. of Child Health and Human Development, Bethesda, Md. Epidemiology. Branch.
P. S. Spiers, S. G. Wright, and D. G. Siegel.
Pediatrics. 54(3), p 317-319, 1974.

Descriptors: *United States, *Mortality, *Hardness(Water), Regression analysis, Variability, Marginal income, Industrial production, *Human diseases, *Public health.
Identifiers: *Infant mortality(US), Great Britain.

Because of a negative association found between infant mortality and water hardness in Great Britain, evidence for a similar relationship was sought in 81 cities of the USA. With infant mortality rate as the dependent variable, its relationships with 5 water indices and 7 other environmental variables were examined. The results of multiple regression analyses found no evidence for a negative association between water hardness and infant mortality. The only independent variables significantly associated with the dependent variable were the percent of low income and the measure of industrialization.--Copyright 1975, Biological Abstracts, Inc.
W77-00698

A MODEL OF RECYCLING AND POLLUTION CONTROL,
Florida Univ., Gainesville. Dept. of Economics.
R. Lusky.
Canadian Journal of Economics, Vol. IX, No. 1, p. 91-101, 1976. 1 fig., 6 ref.

Descriptors: *Recycling, *Mathematical models, *Pollution abatement, Waste treatment, Cost allocation, *Waste disposal, Cost comparisons, Optimization, Byproducts.
Identifiers: Waste utilization.

A quantitative model attempts to eliminate the negative effect on consumers' utility of pollutant accumulation through comparison of altervative means of reducing the accumulated stock of pollution by recycling and/or disposal. Disposal of pollution materials is usually cheaper than recycling, but the model considers both the positive direct effect of the recycled good on the consumer's utility function and determines the best allocation of resources between the recycling activity and disposal. The procedure considers three activities--production of the original consumption good, production of the recycled good, and disposal--and optimizes the allocation of productive inputs (e.g., labor) between them in order to maximize consumer utility. Conclusions cite an optimal solution in which a decrease of the consumption of the original good is matched by an increase in the production and consumption of the recycled good. The government can assist this optimization through interventional means such as taxes, subsidies and cost guarantees, especially in the case of water and general refuse, which can be recycled commercially but where no viable markets have been developed for recycled products. (Harris-Wisconsin)
W77-00711

THE BIOLOGICAL CONTROL OF ALLIGATORWEED,
Agricultural Research Service, Gainesville, Fla. Biological Control Lab.
N. R. Spencer, and J. R. Coulson.
In: Proceedings on Biological Control of Aquatic Macrophytes, Environmental Protection Agency and University of Florida. Preprint, March 1975. 25 p. 6 fig., 27 ref.

Descriptors: *Biocontrol, *Alligatorweed, *Aquatic weed control, *Insects, Water hyacinth, Florida, Distribution, Predation, Southeast U. S.
Identifiers: Agasicles hygrophila, Amynothrips andersoni, Vogtia malloi, Beetles, Thrips, Moths.

Three South American insects suitable for use as biological control agents for alligatorweed have been cleared for use and are established in the southeast U.S. The first successful release of Agasicles hygrophila, the alligatorweed flea beetle, was in the Ortega River, Jacksonville, Florida. Agasicles prefers aquatic alligatorweed, so terrestrial and semi-terrestrial growth is not affected. Agasicles requires warm temperatures but not exceeding 26C, and is rarely found where alligatorweed is nutritionally deficient. Amynothrips andersoni was imported in 1966, but effective control of alligatorweed has not occurred because of their inability to fly and of predation by flower bugs. Vogtia malloi, the alligatorweed stem-borer, released in 1971, can survive over 30 days of 0 Celcius temperatures. It promises to be the most widespread of the introduced alligatorweed enemies. Biocontrol by Agasicles is still erratic and limited to areas without extreme temperature fluctuations. The stress being put on alligatorweed by these insects should reduce its population and make it an acceptable member of the aquatic plant community in the United States. (Buchanan-Davidson--Wisconsin)
W77-00714

HARVESTING THE OCEAN--ON LAND,
Alexander Marine Research Facility, Cayucos, Calif.
J. A. Alexander.
Agricultural Engineering, Vol. 56, No. 10, p. 66-68, 1975.

Descriptors: Design, *Shellfish farming, *Aquiculture, Crabs, Lobsters, Clams, Sculpins, Diets, Byproducts, Commercial shellfish, Recycling, Desalination, Pollution abatement, Sulfur, Smog, Waste treatment.
Identifiers: *Polyculture, *Mariculture, *Abalone, Shells, Waste utilization.

Mariculture facilities developed to produce abalone provide planting stock for fish, the shells are used for calcium buffering, flocculate minerals, and the entrails feed lobsters, crabs, and cabezon. Drifted kelp is used as feed. Water from the abalone tank flows to cabezon and clam tanks, then crab and lobster tanks finally to steelhead tanks. The system design should avoid copper; concrete is an excellent substrate. Most pumping systems are overdesigned. Shellfish tanks are buffered with crushed oyster or clamshells, which act as substrates for bacteria which break down growth-retarding metabolites into compounds useable by algae. Sulfur greatly accelerates production. Sulfur trioxide controls alkali, mosquitoes, and other pests; is useful in water conservation, and cuts fertilizer requirements. Sulfur-containing smog can be used to produce potable water and bacteria-free sludge for fertilizer or animal feed from domestic sewage. When seawater is used to scrub smog, over 90% of the salt is removed, and can be used for irrigation. Raceways simplify feeding and cleaning. Silo culture can produce enormous yields. Wastes from contained animal culture can be separated to provide potable water and bacteria-free sludge to feed shellfish and finned gill feeders. (Buchanan-Davidson--Wisconsin)
W77-00718

WATER POLLUTION INVESTIGATION: ERIE, PENNSYLVANIA AREA,
Betz Environmental Engineers, Inc., Plymouth Meeting, Pa.
For primary bibliographic entry see Field 5C.
W77-00724

THE POTENTIAL CONTRIBUTION OF FERTILIZERS TO WATER POLLUTION,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Soils and Crops.
For primary bibliographic entry see Field 5B.
W77-00732

ARTIFICIAL RECHARGE IN THE GRAND PRAIRIE, ARKANSAS,
Arkansas Univ., Fayetteville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4B.
W77-00734

'ZERO-EFFLUENT' THROWAWAY SYSTEM,
Central Illinois Public Service Co., Springfield.
W. J. Holhut, T. R. Nelson, J. H. Wilhelm, and W. Ellison.
Power, Vol. 120, No. 8, p 66-69, August, 1976. 3 fig, 1 tab.

Descriptors: *Electric power industry, *Air pollution, *Sulfur compounds, *Liquid wastes, *Coals, Solid wastes, Waste treatment.
Identifiers: Sulfur dioxide, Flue gas desulfurization, *Zero effluent.

A throwaway flue gas desulfurization system of the double-alkali type which is designed to remove sulfur dioxide from coal-burning power plant stack gas under zero-effluent, closed-liquid-loop conditions is described. Key system operations include: particulate removal with a high efficiency electrostatic precipitator, multiloop wet scrubbing for isolation of collected tramp components from sulfur dioxide, lime post-precipitation of sulfur dioxide absorbed in a scrubber liquor rich in sodium sulfite, and liquid/solids post-treatment designed to assimilate all liquid wastes as surface moisture in dewatered waste solids. The process is scheduled for startup in late 1977 and is believed to be broadly applicable to high-chloride bituminous coal burned in power plants which require stringent management of solid wastes and liquid effluents. (Kreager-FIRL)
W77-00741

FIGHT AGAINST POLLUTION AND NUISANCES IN THE FRENCH STEEL INDUSTRY (LUTTE CONTRE LES POLLUTIONS ET NUISANCES DANS LA SIDERURGIE FRANCAISE),
For primary bibliographic entry see Field 5D.
W77-00749

STUDY ON TREATMENT OF TANKER DISCHARGED OILY WATER WITH IMPROVED TYPE SLOP TANK (KAIRYOGATA SUROPU TANKU NI YORU TANKA HAISUI SHORI NO KANKYU),
S. Fukuda, Y. Seike, M. Nakajima, and H. Taniguchi.
Mitsubishi Juko Giho (Mitsubishi Heavy Industries Technical Review), Vol. 13, No. 3, p 487-495, 1976. 15 fig, 3 tab, 3 ref.

Descriptors: *Oil industry, *Oil pollution, Ships, *Water pollution control, *Reclamation, Sludge, Design criteria, Performance, Pollution abatement, Separation techniques.
Identifiers: *Slop tanks(Oil).

The development of an improved slop tank as part of an effort to improve load-on-top systems for the prevention of oil pollution by tankers at sea is described. The slop tank consists of a sludge recovery compartment, an oil recovery compartment, and a settling compartment. Tests conducted by the Nagasaki Technical Institute indicate that the improved load-on-top system is capable of satisfying the discharge regulations for crude oil established at the 1973 Convention of the International Maritime Consultative Organization. A segregated ballast system which was adopted at the same convention is also very effective for the prevention of oil pollution at sea; however, the system is applicable only to tankers built hereafter, whereas the load-on-top system can be employed on existing tankers. (Kreager-FIRL)
W77-00750

QUATERNARY AMMONIUM SALTS CONTROL ODORS,
H. Schwartz.
Industrial Wastes, Vol. 22, No. 4, p 31, July/August, 1976.

Descriptors: *Food processing industry, *Odors, *Waste water treatment, *Ammonium salts, *Bactericides, Effluents, Costs, Toxicity, Organic compounds.
Identifiers: Quaternary ammonium salts, *Oder control.

The use of quaternary ammonium salts for the control of odors in industrial effluents is discussed, with particular emphasis on the food processing industry. Quaternary ammonium salts exert a double deodorant action in that they react directly with the molecules of odorants and also kill microorganisms that might cause future odors. Quaternary ammonium salts are strong germicides with low mammalian toxicity and they are also biodegradable. One disadvantage of these salts is that they are neutralized by organic matter such as protein or cellulose; however, a water-soluble complex of quaternary ammonium salts has been developed which overcomes this disadvantage. A successful application of quaternary ammonium salts for the control of effluent odor at a poultry processing plant is described. The daily cost of this odor control method runs about $2.00 for each 100,000 gallons of plant effluent treated. (Kreager-FIRL)
W77-00762

THE ENVIRONMENTAL IMPACT OF A LARGE TROPICAL RESERVOIR: GUIDELINES FOR POLICY AND PLANNING. BASED UPON A CASE STUDY OF LAKE VOLTA, GHANA, IN 1973 AND 1974,
Smithsonian Institution, Washington, D. C.
For primary bibliographic entry see Field 6G.
W77-00767

ALTERNATIVE FUTURES FOR ENVIRONMENTAL POLICY PLANNING: 1975 - 2000,
Stanford Research Inst., Menlo Park, Calif. Center for the Study of Social Policy.
D. S. Elgin, D. C. MacMichael, and P. Schwartz.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 796, Price codes: A13 in paper copy, A01 in microfiche. Environmental Protection Agency, Report EPA-540/9-75-027, October 1975. 286 p, 2 fig, 9 tab, 245 ref, 2 append. 68-01-2698.

Descriptors: *Planning, *Long term planning, *Decision making, *Forecasting, *Alernate planning, *Environmental effects, *Social change, *Ecosystems, *Pesticides, Projections, Social aspects, Environment, Social values.
Identifiers: *Social systems, Productive systems, 'Driving' trends.

A set of alternative future forecasts or scenarios are presented for the Environmental Protection Agency (EPA) to use in the planning of pesticide policy. The report is a tool for anticipating issues and gauging the utilities of policies to meet those issues in the years 1975 - 2000. Ten alternative future scenarios were developed through a procedure consisting of the 4 following steps: (1) trend analysis - both major social trends and trends relevant to the EPA were considered, such as value changes, international social changes, energy, food supply and demand; (2) skeletal scenarios - four critical 'driving' trends were identified, energy, climate, food and social values; (3) futures literature review - 16 descriptors of the future (ranging from research reports and non-fiction to science fiction) were assessed in a common format; (4) scenario expansion. Detailed future scenarios were organized into 3 general categories: industrial success within present structures and boundaries; industrial failure, meaning failure of these present institution; industrial transformation. Policy implications relevant to the EPA are: realization of EPA goals will be difficult from 1975 - 1985; a moderately environmentally conscious society will be present from 1985 - 1995; in the long run, environmental attitudes should support the EPA; in the short run (1975 - 1985), considerable tolerance for environmental degradation appears likely, becoming progressively less tolerant after 1985; a considerable number of policy reversals are probable; uncertainty and error must be included in policy planning processes. (Gentry-North Carolina)
W77-00768

ENVIRONMENTAL MANAGEMENT IN THE MALIBU WATERSHED: INSTITUTIONAL FRAMEWORK,
California Univ., Los Angeles. School of Architecture and Urban Planning.
For primary bibliographic entry see Field 6G.
W77-00769

PLANNING FOR STORM WATER MANAGEMENT,
Watkins (G. Reynolds) Consulting Engineers, Inc., Lexington, Ky.
For primary bibliographic entry see Field 6F.
W77-00770

PROGRAM SPECIFICATION FOR THE SEWER AND WATER ACCOUNTS PROCESSING MODULE - READING USAC PROJECT.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 661, Price codes: A11 in paper copy, A01 in microfiche. Prepared for the Department of Housing and Urban Development, April 1975. 189 p, 50 fig, 5 append. H-1212.

Descriptors: *Systems analysis, *Data collections, *Data transmission, *Information retrieval, *Computer programs, *Programming languages, Management, *Pennsylvania.
Identifiers: Sewer and Water Accounts Processing Module(SWAP), Physical and Economic Development Subsystem(PED Subsystem), Federal Urban Information Systems Inter-agency Committee(USAC), *Reading(PA).

The Sewer and Water Accounts Processing Module (SWAP) is a subset of the Physical and Economic Development Subsystem (PED Subsystem) designed to reflect data commonality, and is sponsored by the Federal Urban Information Systems Inter-agency Committee (USAC). Objectives are to design a municipal information system that will eventually integrate municipal data and support municipal operation, planning and management. The SWAP Module includes those operations securing information on individual accounts, updates this information, determines the volume of customer usage, produces water and sewer bills, receives payment on bills and maintains account status. Operational applications include applications processing, meter reading, cash receipts, bills and reporting. Using the SWAP Module saves clerical labor hours in processing bills and provides a thorough city property data base. The SWAP Module is written in COBOL computer language appended to a 'root' section which is the heart for an integrated data base management system and is common to all programs in the PED Subsystem. SWAP was developed on a Univac 9300-II processor with 32 kilobytes of memory. (Gentry-North Carolina)
W77-00773

GUIDE PLAN REPORT, ANDROSCOGGIN RIVER BASIN, MAINE AND NEW HAMPSHIRE, REGIONAL AND INTERSTATE OVERVIEW.
New England River Basins Commission, Boston, Mass.
For primary bibliographic entry see Field 6B.
W77-00774

THE DILEMMAS OF SETTING SEDIMENT STANDARDS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
J. Gessler.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 2-158 - 2-167, 1976. 1 ref. OWRT A-025-Colo(2). 14-31-0001-4006.

Descriptors: *Standards, *Water quality standards, *Sediments, *Suspended solids, Water quality, Pollution, Pollutants, Rivers, Streams, Biota, Organic matter, Sampling, Geomorphology, Soil erosion, Biology, Sedimentation, Sedimentology, Sediment control.
Identifiers: *Sediment standards.

Society has a multitude of interests in the quality of our rivers as it relates to the movement of sediment. Some of these interests are directly contradictory to each other. Reducing suspended sediment loads in the interest of water quality as related to domestic and industrial use or as related to recreational purposes may result in off-setting the delicate equilibrium of the river's biota due to changes of the food supply or may lead to drastic changes in the river's geomorphic structure. With the biotic an geomorphic characteristics changing from river to river, sediment standards cannot have the form of absolute upper and lower limits for the total sediment transport. They must be tied to the past history of the individual river. Standards without enforcement are meaningless. Enforcement will require monitoring the total sediment transport at strategic locations. Selection of such locations again leads to a dilemma. Devia-

tions in sediment transport from some base line data must be investigated and their cause determined, whether it is natural or man-induced. In order to do so, the deviations must be relatively strong and the number of possible sources relatively small. This demand puts the monitoring stations into the far upstream regions of the watersheds. But this will require a large number of stations which makes the monitoring at these locations economically unfeasible. Ideas for possible solutions were suggested. Special emphasis was on areas in which knowledge is insufficient for reaching any conclusions and will require extensive research efforts. (See also W77-00775) (Sims-ISWS)
W77-00806

ENTRENCHMENT OF DRAINAGE SYSTEMS IN WESTERN IOWA AND NORTHWESTERN MISSOURI,
Agricultural Research Service, Columbia, Mo.
For primary bibliographic entry see Field 2J.
W77-00831

SIMULATION OF DISSOLVED OXYGEN AND BIOCHEMICAL OXYGEN DEMAND PLANTATION CANAL, BROWARD COUNTY, FLORIDA, WITH AN EVALUATION OF THE QUAL-I MODEL FOR USE IN SOUTH FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W77-00852

EVALUATION OF ALTERNATIVE METHODS OF SUPPLEMENTAL RECHARGE BY STORMWATER BASINS ON LONG ISLAND, NEW YORK,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 4B.
W77-00853

MARINE AND ESTUARINE SANCTUARIES. PROCEEDINGS OF THE NATIONAL WORKSHOP ON SANCTUARIES, 28-30 NOVEMBER 1975, WASHINGTON, D. C.,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 2L.
W77-00888

REPORT TO THE CONGRESS ON OCEAN DUMPING RESEARCH, JANUARY THROUGH DECEMBER 1975.
National Oceanic and Atmospheric Administration, Washington, DC.
NOAA 3rd Annual Report. Submitted in compliance with Section 201, Title II of the Marine Protection, Research, and Sanctuaries Act of 1972. (Public Law 92-532), June 1976. 43 p, 7 fig, append.

Descriptors: *Municipal wastes, *Industrial wastes, *Water pollution sources, *Waste disposal, Dredging, Water resources, Research facilities, Continental Shelf.
Identifiers: *Dredged material, *Ocean dumping, Marine Protection Research and Sanctuaries Act, Federal agencies, Outer Continental Shelf.

This is the third annual report to the Congress on the status of Federally sponsored ocean dumping research as required by the Marine Protection, Research, and Sanctuaries Act of 1972, Title II, Section 201. The report describes progress made by Federal agencies in ocean dumping research in 1975, elements of interagency coordination, and future program direction. This report also includes a summary of 1975 activities directed to fulfilling the requirements of Title II, Section 203, research into disposal alternatives to ocean dumping. The three categories of ocean-dumped materials discussed are dredged material municipal wastes, and industrial wastes. (NOAA)
W77-00892

MARINE POLLUTION ARTICLES IN THE LAW OF THE SEA SINGLE INFORMAL NEGOTIATING TEXT,
Rhode Island Univ., Kingston. Law of the Sea Inst.
D. Livingston.
Occasional Paper Series No. 31 (76-2), June 1976. 35 p, 40 ref. SG-04-6-158-44002.

Descriptors: *Law of the Sea, *Air pollution, *Pollution abatement, *Water pollution sources, *International law, Pollution, Conferences, Coasts, *Environmental effects, Continental Shelf.
Identifiers: Ocean pollution, Pollution sources, Ocean dumping, Ocean environments, Underwater environments, Ship wastes.

Articles on international prevention and control of marine pollution are contained in the document that emerged from the 1975 session of the UN Law of the Sea Conference (LOS). The marine environment was one of the major agenda items of Committee III and its portion of the Text contains 44 articles under the heading 'Protection and Preservation of the Marine Environment,' as well as additional sections on 'Marine Scientific Research' and 'Development and Transfer of Technology.' The analysis in this paper gives a coherence to the topic and focuses on pollution, excluding such cognate areas as scientific research and conservation of resources. The Text is in large part a product of recent international experience in controlling marine pollution and points the way toward a foundation or framework of general obligations which are to enhance and systematize both past efforts and future international negotiations on this subject and to mandate the enactment by states of relevant domestic legislation. (NOAA)
W77-00894

WISCONSIN NATURAL RESOURCE USE CONTROLS AND ASSISTANCE.
Wisconsin Dept. of Natural Resources, Madison.
For primary bibliographic entry see Field 6E.
W77-00915

THE CANADA WATER ACT, ANNUAL REPORT, 1974-1975.
Department of the Environment, Ottawa (Ontario).
Information Canada, Ottawa, 1975, 34 p.

Descriptors: *Canada, *Water law, *Water resources, *Water quality control, *Administration, Federal government, State governments, Comprehensive planning, Cost sharing, Food control, Social aspects, Economics, Governmental interrelations.
Identifiers: *Canada Water Act, Annual report, Provincial governments.

The provisions of the Canada Water Act embracing the formation of federal-provincial consultative committees, implementation agreements, planning studies and other cooperative arrangements, water quality management and eutrophication control, are summarized. To assist in the implementation of the Act, a decentralization program has been instituted for the negotiation and administration of federal-provincial water agreements; Regional Directorates have been organized in the Pacific and Yukon, Western and Northern Ontario, Quebec, and Atlantic Regions. A water resources research support program is continuing with grants of $1 million shared by 20 universities. The principal federal-provincial cooperative agreements under the Act are listed, showing the entities, cost-sharing arrangements, the objectives, and current status. The surveillance program to regulate phosphorus in laundry detergents and its effectiveness are described. The federal water management capability is supplemented by the Canada Centre for Inland Waters, the document reference center (WATDOC), and the national water quality data bank (NAQUADAT). The systematic collection and compilation of data on streamflow, water levels, sediment transport, groundwater, water quality and related information on glaciers, snow and ice is continuing under a cost-sharing agreement with the provinces totaling $8,760,200. Socio-economic studies are also undertaken under the provisions of the Act. (Auen-Wisconsin)
W77-00916

CARRYING CAPACITY PROTOTYPE INVESTIGATIONS IN THE STATE OF HAWAII, SUMMARY REPORT,
Hawaii State Office of Environmental Quality Control, Honolulu. Steering Committee on Carrying Capacity Studies.
For primary bibliographic entry see Field 6G.
W77-00917

OPTIMAL TAXATION POLICIES FOR CONSERVATION AND RECYCLING,
Florida Univ., Gainesville. Dept. of Economics.
For primary bibliographic entry see Field 6G.
W77-00921

ENVIRONMENTAL PROTECTION AND SPATIAL ALLOCATION OF INVESTMENTS,
Erasmus Univ., Rotterdam (Netherlands).
For primary bibliographic entry see Field 6G.
W77-00922

CLADOPHORA IN THE GREAT LAKES,
Limnos Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5C.
W77-00928

A REGIONAL STORMWATER DRAINAGE MODEL,
For primary bibliographic entry see Field 4A.
W77-00940

STORM RUNOFF ROUTING TO A TIDAL OUTFALL: A CASE STUDY,
For primary bibliographic entry see Field 4A.
W77-00952

AN 'ENVIRONMENTAL' APPROACH TO STORMWATER MANAGEMENT IN THE ADELAIDE HILLS (AUSTRALIA),
South Australian Inst. of Tech., Adelaide.
For primary bibliographic entry see Field 4A.
W77-00953

1974 ANNUAL REPORT, (WASHINGTON NATURAL RESOURCES AND RECREATION AGENCIES).
1974, p. 17-23, 4 fig.

Descriptors: *Washington, *Ecology, *Legislation, *Water management(Applied), *Waste disposal, Penalties(Legal), Water pollution, Flood control, Water utilization, State governments, Discharge(Water), Planning, Water quality, Water law, Environmental effects, Economics, Permits.
Identifiers: Administrative regulations, Comparative law.

The Natural Resources and Recreation Agencies for the state of Washington have provided a broad view of the fiscal year 1974 operations and policies of the state Department of Ecology. The report reiterates the wholistic approach taken by the Department in dealing with controversial issues such as industrial waste discharge permits and whether or not to relax air and water quality standards to increase energy production. Also examined is the impact of 1974 state legislation on Departmental operations. This legislation includes (1) the Noise Act which was designed to complement the

Federal Noise Pollution Act of 1972, (2) the amendments to the state Environmental Policy Act, (3) a Baseline study bill to prevent and control oil pollution, and (4) the Forest Practices Act. The report contains a summary of Department activities in the following areas: civil penalties; air quality; solid waste management; litter control; shoreline management; water quality; flood damage reduction; water use; water planning; DDT spraying; and coordinated environmental permits. Graphs are presented indicating collected civil penalties for 1971-1974, ground and surface water right applications for 1967-1974, sewage facility construction funds for 1970-1974, and environmental grants to local agencies in fiscal year 1974. (Reinders-Florida)
W77-00957

A PLAN FOR MICHIGAN'S SHORELANDS.
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 6B.
W77-00958

NONPOINT POLLUTION: AN EPA VIEW OF AREAWIDE WATER QUALITY MANAGEMENT,
Environmental Protection Agency, Washington, D. C. Water Planning Div.
M. Pisano.
Journal of Soil and Water Conservation, Vol 31, No 3, p 94-100, May/June 1976. 7 p, 1 map, 2 photo.

Descriptors: *Federal Water Pollution Control Act, *Sedimentation, *Regulation, *Water quality, *Water pollution sources, Legal aspects, Legislation, Management, Monitoring, Penalties(Legal), Permits, Standards, Water policy, Water quality standards, Water treatment, Water resources, Water pollution.
Identifiers: *FWPCA Amendments of 1972, *Nonpoint sources(Pollution).

Point source pollution by industrial effluents and untreated municipal sewage has been the focal point of American pollution control efforts. If clean water goals are to be met by the 1983 target date, however, nonpoint sources must also be given attention. These sources include agricultural and silvicultural runoff, acid mine drainage, urban runoff, and sedimentation from construction sites. Nonpoint sources account for 92% of all suspended solids in water. The treatment of these solids is specified in the Federal Water Pollution Control Amendments of 1972. Section 208 calls for 'best management techniques' to prevent runoff, as well as other planning procedures. An analysis of the Amendment's potential for fighting nonpoint source pollution is included. (Frank-Florida)
W77-00959

NONPOINT POLLUTION AND WATER QUALITY MONITORING,
Georgia Univ., Athens. Inst. of Community and Area Development, and Georgia Univ., Athens. Inst. of Ecology.
J. Cooley.
Journal of Soil and Water Conservation, Vol 31, No 2, p 42-43, March-April 1976. 2 p.

Descriptors: *Water quality control, *Data collections, *Water pollution, *Water pollution sources, *Monitoring, Water pollution, Water pollution effects, Control, Control systems, Data transmission, Maintenance, Measurement, Operations, Regulation, Water quality, Erosion, State governments.

Monitoring of water quality will be necessary in the effort to control non-point sources of pollution. In addition, baselines of water quality must be established and a continuing assessment of control programs must be provided. Any monitoring system must characterize and define trends in the physical, chemical, and biological condition of water. This monitoring, which should be conducted by the state, will determine if management practices are obtaining the desired results. Because of the cost involved in monitoring all major nonpoint sources both upstream and downstream, the author suggests that sites should be established at carefully selected indicator operations of nonpoint sources within different regions of the state. The author acknowledges, however, that current problems make such site selections untenable for the present. Regardless of site location, periodic samples should be taken when triggered by certain climatic events. The parameters of this monitoring should be controlled by a specially developed systems model of the receiving body of water. The mere outlay of large amounts of monev does not guarantee quality; rather, careful preparations should be made before any monitoring system is implemented. (Frank-Florida)
W77-00960

INSTITUTIONAL ARRANGEMENTS FOR LAKE MANAGEMENT IN WISCONSIN,
Wisconsin Univ., Madison. Environmental Resources Unit.
For primary bibliographic entry see Field 6E.
W77-00966

NEW FEDERAL REGULATIONS FOR DREDGED AND FILL MATERIAL,
Smith (David D.) and Associates, San Diego, Calif.
D. Smith.
Environmental Science and Technology, Vol 10, No 4, p 328-33, April 1976. 6 p, 1 illus, 2 photo, 1 chart.

Descriptors: *Navigable waters, *Federal Water Pollution Control Act, *Dredging, *Federal project policy, *Environmental effects, Regulation, Legal aspects, Legislation, Management, Permits, Water policy, Channel improvement, Hydraulic mining, Excavation, Flood protection, Flow, Judicial decisions.
Identifiers: *Fill permits, *Army Corps of Engineers.

In March 1975, the U. S. District Court for the Districts of Columbia ruled that the responsibility of the U.S. Army Corps of Engineers (ACE) to regulate the discharge of dredged or fill material to navigable waters extends to all waters of the United States. The court also directed the Corps to revise its regulatory procedures accordingly, and the Environmental Protection Agency (EPA) to issue the applicable discharge guidelines forthwith. Prior to the 1975 decision, the Corps had limited the exercise of its responsibilities to the navigable waters of the U. S. This could be reasonably defined, but 'all water' is a vague phrase not defined by Congress or the courts. The purpose of this article is to explain the interpretation of 'all waters' ultimately arrived at, as well the EPA guidelines that followed the decision. These guidelines provide no single technical evaluation procedure for nationwide use; rather, they provide for various types of test procedures, including mechanical analyses, elutriate tests, total sediment chemical analyses, bioassays, and biological evaluations. These guidelines must be reviewed at least once every three years and revised as indicated by the accumulation of information from pertinent research. (Frank-Florida)
W77-00967

PELAGIC TAR,
For primary bibliographic entry see Field 5B.
W77-00969

PAYING TO POLLUTE.
Environment, Vol 18, No 5, p 16-20 (1976). 5 p, 3 photo.

Descriptors: *Water policy, *Water pollution treatment, *Water pollution control, *Economic efficiency, *Costs, Benefits, Planning, Marginal utility, Marginal productivity, Marginal benefits, Air pollution, Marginal costs, Pollution charges(Taxes).
Identifiers: *Organisation for Economic Co-Operation and Development.

There are two main schools of thought on pollution control: those who advocate the direct imposition on polluters of regulations, usually emission standards; and those who argue for a levy on polluting wastes. The latter is the pollution charges approach, which is being evaluated in Europe by the Organisation for Economic Co-Operation and Development (OECD). OECD's study has ascertained that, even when used as the principal policy instrument, pollution charges are always combined with direct control. Several countries are planning to turn to pollution charges, among them Germany, the Netherlands, and France. Examples of the use of pollution charges are given in regard to water pollution, air pollution, noise and solid wastes. The following conclusions are reached: (1) that systems of charges should be as simple and easy to manage as possible; (2) that decentralization of management should be used to provide the best pollution charge framework; (3) that the public should be involved in running the system of charges; and (4) that charges should rise over time so as to strengthen the disincentive until the desired environmental objectives are attained. (Frank-Florida)
W77-00972

PROTECTION OF THE MARINE ENVIRONMENT FROM POLLUTION,
R. A. Frank.
Georgia Journal of International and Comparative Law, Vol 6, p 73-91 (1976). 19 p, 55 ref.

Descriptors: *International law, *United Nations, *Law of the sea, *Pollution, *Oceans, Water pollution, Environmental effects, Water pollution sources, Mining, Oil spills, Oil wastes, Legal aspects, Water law, Navigation, Water pollution control, Foreign countries.

Discussed here are six issues relating to the protection of the marine environment from pollution in the context of the Third United Nations Conference on Law of the Sea. They are: (1) vessel-source pollution; (2) control of deep seabed mining; (3) landbased sources of pollution; (4) pollution from resource activities in the economic zone; (5) environmental monitoring and assessment; and (6) the double standard. Concerning the double standard, developing nations have insisted that they be subjected to less stringent requirements than those required of the developed countries with respect to virtually every environmental protection obligation. The author concludes that clear limitations should be placed on any double standard. They would include limiting it to land-based activities, requiring a case by case showing that substantial economic injury will result if pollution controls of a certain kind are adopted, and insuring that toxic and hazardous substances remain under the most stringent pollution control standards. None of these, however, has yet been reduced to draft form. (Frank-Florida)
W77-00973

MAN'S EFFECT ON THE QUALITY OF OUR WATER,
Central and Southern Florida Control District, West Palm Beach.
For primary bibliographic entry see Field 5C.
W77-00974

OF PCB PPMS FROM GE AND A SNAFU FROM EPA AND DEC,
For primary bibliographic entry see Field 5A.
W77-00978

THE SELLING OF THE SHELF,
J. Mitchell.
Audobon, Vol 77, p 44,46-63, May 1975. 19 p, 1 map, 3 illus.

Descriptors: *Continental shelf, *Oil pollution, *Oil industry, *Offshore platforms, *Drilling, Drilling equipment, Oil, Oil fields, Water pollution, Engineering structures, Coasts, Shores, Exploration, Exploitation, Oil reservoirs, Gasoline, Oil wastes, Geologic formations, Secondary recovery(Oil), Water pollution treatment.
Identifiers: *Coastal Zone Management Act, *Coastal zone management, *Environmental impact statement, Cape May, Santa Barbara.

The Coastal Zone Management Act of 1972 was designed to help coastal states inventory their shorefront resources and draw up long-range plans to manage those resources wisely, as well as to provide planning grants to speed up the process. Under President Ford, however, the intent of the legislation has been avoided, and indiscriminate offshore drilling has been encouraged in an effort to increase the gross national product. Like drilling, the leasing of offshore areas has also proceeded at an astronomic rate. Areas encompassed by these leases include Cape May, Long Island, the Alaskan shore, and a large stretch of the California coastline, all of which will subject to potential oil spillages on the order of the Santa Barbara disaster of a few years ago. Yet even with these threats, no federal thought is being given to planning for the survival of these coastal areas. This is unfortunate since potential solutions do exist. For instance, increased federal efforts in conserving oil and gas, especially in the auto industry, could obviate much of the need for new drilling. Until such efforts are initiated, however, the oil companies will continue to push for speedy expansion of offshore drilling. (Frank-Florida)
W77-00979

CORPORATE RESPONSIBILITY IN SILVER BAY,
J. Mitchell.
Audobon, Vol 77, p 47-61, March 1975. 15 p, 1 map, 6 photo.

Descriptors: *Industrial wastes, *Lake Superior, *Water pollution, *Silicates, *Environmental effects, Environment, Environmental sanitation, Industrial production, Industrial plants, Economics, Economic feasibility, Economic efficiency, Economic impact, Employment, Regional economics, *Minnesota.
Identifiers: *Silver Bay(Minn), *Injunctive relief, *Taconite tailings.

Reserve Mining Company of Silver Bay and Babbitt, Minnesota, has been involved in one of the most environmental struggles of the 70's. Several years ago, environmentalists instituted legal proceedings to enjoin Reserve from dumping 67,000 tons of taconite tailings into Lake Superior every day. After the federal judge was informed that the tailings contained cancer causing silicate fibers, an injunction was issued. In issuing the injunction, the judge rejected a Reserve proposal that would have allowed the dumping to continue if a new process was instituted that would make sure that all deposits went right to the bottom. The injunction was stayed by a circuit court and this stay was upheld by the Supreme Court without comment. Although other companies have managed to dump on land, Reserve continues to fight the idea as being economically impossible. Thus, until the litigation is settled, Reserve will continue to dump taconite tailings into Lake Superior. Despite the dumping's adverse effects, there is not much anyone can do to stop it. (Frank-Florida)
W77-00980

DECISION TO LEASE OUTER CONTINENTAL SHELF LANDS,
Massachusetts Energy Policy Office, Boston.

For primary bibliographic entry see Field 6E.
W77-00981

ORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY--EFFLUENT LIMITATIONS, GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 40, No 233, p 56436-42, December 3, 1975. 7 p.

Descriptors: *Federal Water Pollution Control Act, *Chemical industry, *Waste water treatment, *Water quality standards, *Regulation, Standards, Administrative agencies, Federal government, Biochemical oxygen demand, Chemical oxygen demand, Chemicals, Industrial wastes, Toxicity, Potable water, Effluents, Costs, Economic impact, Water quality control, Pollutants, Public health, Aquatic life, Cost-benefit analysis, Pollution.
Identifiers: *Carcinogens, Administrative regulations.

The Environmental Protection Agency (EPA) has established final amendments to the regulations setting guidelines and standards for effluent limitations for the ethylene oxide, ethyl glycol, methyl amines, and oxo chemicals production subcategories of the organic chemicals manufacturing point source category. Both the guidelines representing the degree of effluent reduction attainable when applying the best practicable control technology currently available and the standards of performance for new sources set limitations on the effluent characteristics of BOD5, TSS, and pH. The guidelines representing the degree of effluent reduction attainable by application of the best available technology economically achievable include limitations on the effluent characteristics of COD, BOD5, TSS, and pH. The EPA has summarized the comments made on the regulations by members of the chemical industry and has responded to the comments. In an analysis of the potential benefits and costs of the regulations, the EPA points out that since some organic compounds are carcinogenic and some are toxic to aquatic life, their presence in the nation's water is a potential health hazard. (Capehart-Florida)
W77-00983

ENVIRONMENTAL PROTECTION AND ENHANCEMENT (GENERAL GUIDANCE TO ELEMENTS WITHIN THE DEPARTMENT OF THE ARMY ON ENVIRONMENTAL PROTECTION).
Office of the Cheif of Engineers (Army), Washington, D. C.
Federal Register, Vol 40, No 232, p 55962-83, 55999-56013, December 2, 1975. 37 p, 16 fig, 2 map.

Descriptors: *Environmental effects, *Regulation, *Pollution abatement, *Environmental control, *Federal government, Water pollution control, Air pollution, Administrative agencies, Standards, Water treatment, Waste water treatment, Water conservation, Pollutants, Effluents, Recycling, Oil spills, Toxins, Navigable waters, Legislation, Landfills, Flood plains, Channels, Federal Water Pollution Control Act, Construction.
Identifiers: *Administrative regulations, *Environmental impact statement.

The Department of the Army is adopting a regulation specifying policies, responsibilities, and procedures for the protection and preservation of environmental quality. The goal of the Army is to minimize adverse environmental effects without impairing the Army's mission. Responsibilities for reviewing environmental policy, proposing new programs, and coordinating activities are delegated to specific branches within the Army. An annual status report will be prepared on environmental programs and activities. Subpart B of the regulation deals with environmental considerations in Army actions. The types of actions requiring an environmental impact assessment or an environmental impact statement (EIS) are listed. The factors to be considered in determining the environmental impact are detailed. The outline of an EIS is included. Subpart C covers the procedures for implementing the Federal Water Pollution Control Act. Subpart D relates to air pollution abatement procedures. Subpart I contains the procedures for control of discharge of oil and hazardous substances. Subpart J specifies the reporting procedures to be followed within the Army to control environmental pollution from existing facilities. Sample reports are included. (Capehart-Florida)
W77-00984

OCEAN DUMPING; PROPOSED SITE DESIGNATION.
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 41, No 85, p 18094-95 April 30, 1976. 2 p.

Descriptors: *Toxins, *Chemical wastes, *Incineration, *Gulf of Mexico, *Sites, Waste disposal, Toxicity, Oceans, Administrative agencies, Federal government, Regulation, Wastes, Ultimate disposal, Disposal, Water quality, Water quality control, Organic compounds, Chlorine, Water pollution sources.
Identifiers: *Ocean disposal, Organic chlorine compounds.

The Environmental Protection Agency is proposing the designation of a site in the northwestern part of the Gulf of Mexico for use in the incineration of highly toxic chemical wastes. The primary use of the site will be for the incineration of organo-chlorine wastes. Studies on the area of the proposed site show little or no environmental impact from incineration of chemical wastes. Ocean incineration has therefore been determined to be an environmentally sound alternative method for disposal of these wastes. (Capehart-Florida)
W77-00985

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM AND STATE PROGRAM ELEMENTS NECESSARY FOR PARTICIPATION.
Environmental Protection Agency, Washington, D. C.
Federal Register, Vol 41, No 30, p 6281-3 Feb 12, 1976. 3 p.

Descriptors: *Lumbering, *Forest management, *Water quality standards, *Permits, *Regulation, Judicial decisions, Administrative agencies, Federal government, Standards, Pollutants, Water pollution, Percolation, Precipitation(Atmospheric), Runoff, Navigable waters, Burning, Pesticides, Lumbering, Gravels, Rocks, Water quality control.
Identifiers: *Administrative regulations, *National Pollutant Discharge Elimination System.

In compliance with an order of the federal district court, the Environmental Protection Agency (EPA) is proposing regulations which apply the National Pollutant Discharge Elimination System permit program to point source discharges in the silviculture category. Previous regulations excluded this category from permit requirements. The proposed regulations distinguish between point source and non-point source water pollution. Silvicultural activities resulting in water pollution are not subject to the permit program if the pollution is caused by natural processes and is not traceable to any specific facility. Excluded activities include nursery operations, site preparation, controlled burning, pesticide control, and harvesting operations. Permits with effluent limitations will be required for discharges from point sources such as rock crushing, gravel washing, log sorting and log storage facilities. (Capehart-Florida)

W77-00986

TRAIN V COLORADO PUBLIC INTEREST RESEARCH GROUP, INC. (CONFLICT OF FEDERAL WATER POLLUTION CONTROL ACT AND THE ATOMIC ENERGY ACT).
For primary bibliographic entry see Field 6E.
W77-00987

GARBAGE POLLUTION, DISPOSAL INTO STREAMS.
For primary bibliographic entry see Field 6E.
W77-00990

PROTECTION OF PUBLIC WATER SUPPLY.
For primary bibliographic entry see Field 6E.
W77-00991

1971 WATER RESOURCES ACT.
For primary bibliographic entry see Field 6E.
W77-01002

APPROPRIATION.
For primary bibliographic entry see Field 6E.
W77-01012

A METHOD FOR DETERMINING THE DISPERSIVE CAPACITY OF PREPARATIONS USED FOR REMOVING OILS FROM WATER SURFACE, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 5B.
W77-01028

ANTHROPOGENIC MORPHOGENESIS OF THE RELIEF OF THE LOWER DON, (IN RUSSIAN),
Rostov-on-Don State Univ. (USSR).
For primary bibliographic entry see Field 2H.
W77-01039

WATERS--FISH AND GAME--DEPOSIT OF PESTICIDES IN PUBLIC WATERS.
For primary bibliographic entry see Field 6E.
W77-01042

RESERVE MINING CO V CITY OF DULUTH (FILTRATION OF LAKE SUPERIOR BY CORPS OF ENGINEERS).
For primary bibliographic entry see Field 6E.
W77-01043

IT'S TIME TO STOP KILLING THE OCEAN,
National Wildlife Federation, Washington, D. C.
K. Kamlet.
National History, Vol 13, No 3, p 18-21, April, 1975. 4 p, 1 map, 2 photo.

Descriptors: *Oceans, *Water pollution, Water pollution effects, *Sludge, *Sludge disposal, Administrative agencies, Regulation, Organic wastes, Solid wastes, Wastes, Fish, Cost analysis, Cost comparisons, Waste disposal, Permits, Ships.
Identifiers: *Ocean dumping, *Marine protection, Research and Sanctuaries Act of 1972.

Ocean dumping of wastes and sewage is continuing at a steady and high rate. As a result of this dumping, large areas of ocean are being seriously harmed, and fish catches are being depleted. Part of the reason for this increase in harmful dumping is that the Marine Protection, Research and Sanctuaries Act of 1972 which was designed to regulate ocean dumping is not being enforced. Under this Act, dumpers of dredge spoils are supposedly required to obtain a permit from the Army Corps of Engineers while all other dumpers are required to obtain a permit from the Environmental Protection Agency. Unfortunately, there are numerous ways by which these agencies may circumvent the regulations they are supposed to enforce. Two other major obstacles to effective long-term regulation of ocean dumping are that of accurately measuring the effects of such dumping, and the present absence of feasible alternatives. The author concludes that man's chance of survival will be seriously reduced if steps are not taken to prevent the indiscriminate pollution of the sea caused by dumping. (Frank-Florida)
W77-01046

MID-SHIAWASSEE COUNTY CONCERNED CITIZENS V TRAIN (ENVIRONMENTAL IMPACT AS TO A PHYSICAL-CHEMICAL MODE OF TREATMENT FOR A WASTE-WATER TREATMENT PLANT).
For primary bibliographic entry see Field 6E.
W77-01048

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

ISSUES RELATED TO INTERFACING WATER RESOURCE PLANNING WITH LAND USE PLANNING: DEVELOPMENT AND APPLICATION OF QUANTITATIVE PROCEDURES,
INTASA, Menlo Park, Calif.
For primary bibliographic entry see Field 6B.
W77-00526

SYSTEMATIC APPROACH TO WATER RESOURCES PLAN FORMULATION.
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
Available from the National Technical Information Service, Springfield, VA 22161 as PB259 338, Price codes: A13 in paper copy, A01 in microfiche. Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics, Technical Report 187, July 1974. 173 p, 60 fig, 26 tab, 50 ref. Edited by J. C. Schaake, Jr. OWRT C-4232(9084)(1).

Descriptors: *Optimization, *River basins development, *Decision making, *Comprehensive planning, Model studies, *Optimum development plans, Simulation analysis, *Pennsylvania, Multiple-purpose projects.

A new computational approach has been developed for the practical solution of the nonlinear, stochastic optimization problem representing many complex river basin decision problems. This approach involves a simulation, model, a computational scheme for estimating marginal net benefits due to changing each decision variable, and a search procedure. The approach was tested by application to three example problems using data from an actual river basin planning study. An early motivation for this research was the need for an improved planning approach to resolve the great differences between screening (or optimization) model results and simulation model results when these systems analysis tools were used in actual planning practice. Screening models of complex systems usually must neglect important stochastic or nonlinear relationships (or else become computationally intractable). Since the role of screening models in planning would be to aid in plan formulation and since screening models fail to recognize very important aspects, it follows that better plans may exist than would be suggested by existing screening models. The research results have not yet been applied in an actual planning project, and its was beyond the scope of the work to make such an application. Nevertheless, the need for this research did derive directly from a river basin planning study supervised by the principal investigator. Also, the simulation model developed under this project has been used in a study for the U.S. Army Corps of Engineers of Water Resource Development in the South Central Pennsylvania Region. (See W77-00533 thru W77-00535)
W77-00532

ROLE OF PARTIAL GRADIENT ESTIMATION BY SIMULATION IN WATER RESOURCE PLAN FORMULATION, PART I,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
J. C. Schaake, Jr., and T. B. Facet.
In: Systematic Approach to Water Resources Plan Formulation, Technical Report No. 187, July 1974. 112 p, 18 fig, 17 tab, 17 ref. OWRT C-4232(9084)(1).

Descriptors: *Mathematical models, *Estimating, *Simulation analysis, Model studies, Planning, *Optimum development plans, River basin development, *Optimization.
Identifiers: *Partial gradients(Estimation).

A simulation-optimization mathematical model for design purposes in water resources planning is presented. The model accounts for the non-linear, stochastic nature of water resources systems and explicitly evaluates short term costs if a water requirement is not met. Multipurpose, multi-unit system can be analyzed by the model. The mathematical model consists basically of two parts: (1) a simulation procedure, and (2) a search technique. The focus in this study has been the estimation of partial gradients of the response function during the normal execution of the simulation model. Different components of the benefit function and how they affect the marginal benefit of a particular variable are discussed in detail. A general procedure to estimate the marginal contribution to the benefit function of a unit change in any variable in the system is developed. Particular rules for each type of node in the system are given. The model was applied to three different river basin configurations involving reservoirs and irrigation areas, but other activities such as municipal water supply, low flow ground water supply, etc., may be studied. Comparisons between the results obtained by the proposed model and those from a deterministic linear programming model are made. (See also W77-00532)
W77-00533

A SEARCH TECHNIQUE FOR FORMULATING IMPROVED WATER RESOURCES CONFIGURATIONS, PART II,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
K. M. Leytham.
In: Systematic Approach to Water Resources Plan Formulation, Technical Report No. 187, July 1974. 132 p, 42 fig, 9 tab, 23 ref. OWRT C-4232(No. 9084)(1).

Descriptors: *Optimization, *Simulation analysis, Model studies, *Planning, Reservoirs, Water resources development, Optimum development plans.
Identifiers: *Gradient estimates, *Multi-objective theory, Search techniques.

This study shows the development of a search package for use in the optimization of non-linear stochastic water resources systems from a multiobjective viewpoint. Multiobjective theory enables one to aggregate the net benefits toward various objectives as a sum of weighted benefits which may be regarded as the response of the system for a certain project configuration. Recent advances in simulation techniques have resulted in simulation models which not only predict the responses of a system but also provide estimates of the partial gradients on the response surface. These gradient estimates are useful in that they indicate the changes in project configurations which would result in an improved response. This study

has aimed at finding a search technique which can make efficient use of the inexact gradient estimates in locating the maximum point on the response surface. Study and testing of various search techniques indicated that Steepest Ascent and a modified version of Pattern Search made the most efficient use of gradient estimates. These two methods were combined in a small search package which was then tested, in combination with a simulation model, in the optimization of several example water resource systems. The results showed the combination of search and simulation to be very effective on small systems at least. (See also W77-00532).
W77-00534

SCREENING MODELS IN WATER RESOURCES PLANNING, PART III,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
E. A. McBean.
In: Systematic Approach to Water Resources Plan Formulation, Technical Report No. 187, July 1974. 24 p, 9 ref.

Descriptors: *Model studies, *Planning, *Optimization, Mathematical models, Simulation analysis, Linear programming.
Identifiers: **Screening models, *Deterministic models.

The study has briefly indicated some of the advantages and disadvantages of a number of the optimization models that have been employed in water resource systems planning. The various types of models are not panaceas that handle all problems of the system planner, nor are they without their limitations; but they do provide a powerful tool that can be very effective. The difficulty in model selection becomes one of arriving at an appropriate balance between model realization, data sophistication, and computational requirements. (See also W77-00532)
W77-00535

WORKSHOP PROCEEDINGS: CITIZEN PARTICIPATION IN WATER RESOURCES DECISION-MAKING,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W77-00730

CARRYING CAPACITY PROTOTYPE INVESTIGATIONS IN THE STATE OF HAWAII, SUMMARY REPORT,
Hawaii State Office of Environmental Quality Control, Honolulu. Steering Committee on Carrying Capacity Studies.
For primary bibliographic entry see Field 6G.
W77-00917

OPTIMAL EXPLOITATION OF MULTIPLE STOCKS BY A COMMON FISHERY: A NEW METHODOLOGY,
British Columbia Univ., Vancouver. Inst. of Animal Resource Ecology.
R. Hilborn.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 1, p. 1-5, 1976. 2 fig., 1 tab., 14 ref.

Descriptors: *Dynamic programming, *Marine fisheries, *Fish harvest, *Optimization.
Identifiers: *Mixed fish stocks.

A technique superior to the best methods currently in use to calculate optimal harvest rates for mixed fish stocks using stochastic dynamic programming is described. The main advantages of this method are: (1) The stock recruitment model can have unlimited complexity as the number of parameters in the model does not affect the computation required or the reliability of results; (2) parameters may be stochastic but as the number of stochastic possibilities considered for the parameter values increases so does the computation time; (3) there may be judgmental uncertainty about parametric values; while this is analogous to stochastic variability of parameters, it is conceptually distinct; (4) the objective functions (maximization) can be as complex as desired; it need not be restricted to long-term catch--it can be catch dollar value, total employment generated from the fishery, or any combination of factors; (5) discounting rates can easily be introduced. The total objective does not need to be summed over time but may be multiplicative over time. Although the number of computations goes up linearly with the number of time intervals, it does go up geometrically with the number of state variables and stochastic parameters, thus practically optimizing models are restricted to, at most, five state variables. (Auen-Wisconsin)
W77-00920

6B. Evaluation Process

ISSUES RELATED TO INTERFACING WATER RESOURCE PLANNING WITH LAND USE PLANNING: DEVELOPMENT AND APPLICATION OF QUANTITATIVE PROCEDURES,
INTASA, Menlo Park, Calif.
C. H. Jolissaint, W. B. Betchart, K. Skurski, and S. Davenport.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 331, Price codes: A11 in paper copy, A01 in microfiche.Final Rpt. IRP 74-01, May 1976. 210 p, 26 fig, 60 tab, 80 ref, 4 append. OWRT C-6057(5207)(1). 14-31-0001-5207.

Descriptors: *Regional analysis, *River basin development, Water resources development, Land resources, Cost sharing, *Financial feasibility, Long term planning, Low flow augmentation, Water quality control, Multiple purpose projects, *Planning, *Coordination, *Land use, *Comprehensive planning, Cost analysis, Community development.
Identifiers: Regional coordination, Simplified modeling, Fiscal cost analysis, Community development planning, Site development cost modeling, Regional water balance.

This research addresses three of many requirements for interfacing water and land resources planning: (1) need to coordinate separate resource planning activities and assign regional priorities; (2) need to relate environmental, social and economic benefits and costs of community land use plans to similar decision criteria at the regional water resources planning level; (3) need to quickly convert land use information into water resource requirements and costs. Results include: (1) simplified quantitative procedures based on regional water, land and mass balance relationships and demonstrated in the Platte River, Nebraska Level B regional study; (2) an improved fiscal cost analysis procedure for short term land use decisions based on economic, social and environmental goals, demonstrated in Richmond, Calif.; (3) extension of site development cost models to analyze housing cost associated with community use policies, demonstrated in Napa, California. Recommendations include: The physical conservation relationships developed in this study should be further refined, especially for mass balance related to water quality determinations, in order to focus these quantitative procedures toward integration of water quality planning with water quantity planning. A study should be undertaken to implement the project's fiscal analysis methodology in a community undergoing development pressures in order to obtain operational experience with incorporating the fiscal analysis procedure in the urban land use planning process. A further study should be made predicting demand characteristics for housing. Using the housing cost models developed to provide the cost for the type of house being demanded in an area would provide input into the effect that land use policies associated with the general plan will have on the future cost of homes in a community.
W77-00526

TECHNOLOGY ASSESSMENT FOR NEW WATER DEVELOPMENT PROJECTS, (VOLUME I),
Virodyne Corp., Littleton, Colo.
J. C. Kellogg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 276, Price codes: A21 in paper copy, A01 inn microfiche. Completion Report, August 1976. 480 p, 63 fig, 32 tab, 177 ref. OWRT C-4319(9062)81).

Descriptors: Technology, Water resources development, Planning, *Projections, Forecasting, Input-output analysis, *Southwest U.S., *Alternative planning, *Water allocation(Policy), Arid lands, *Future planning(Projected), *Long-term planning, Project planning, Economic impact, *Social impact.
Identifiers: *Arid West, *Technology assessment.

Given historical trends and present conditions in the arid West, new water supplies are expected to have far-reaching consequences for the economic life of the region and drastic alterations in lifestyle. In using the theme that water resources planning is future-oriented, methods of technology assessment are utilized for tracing possible effects of legislative proposals, new technologies or other water actions and programs which may pre-ordain a whole lifestyle change in the region. Three clusters of technology assessment methods are used to illustrate the usefulness of this approach, namely descriptive (e.g., dynamic modeling and cross-impact matrices); predictive (such as trend extrapolation and correlation); and, prescriptive (including Delphi, decision trees and scenarios). Finally, the approach also emphasizes the sociopolitical character within which judgments of technology assessment as to potential or preferable futures can be made in order to reach balanced decisions concerning long-range impacts of water resources development.
W77-00527

FEDERAL WATER RESOURCES RESEARCH PROGRAM FOR 1973 AND 1974, COMMITTEE ON WATER RESOURCES RESEARCH OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY, (1976).
For primary bibliographic entry see Field 9D.
W77-00531

SYSTEMATIC APPROACH TO WATER RESOURCES PLAN FORMULATION.
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W77-00532

ROLE OF PARTIAL GRADIENT ESTIMATION BY SIMULATION IN WATER RESOURCE PLAN FORMULATION, PART I,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W77-00533

A SEARCH TECHNIQUE FOR FORMULATING IMPROVED WATER RESOURCES CONFIGURATIONS, PART II,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W77-00534

SCREENING MODELS IN WATER RESOURCES PLANNING, PART III,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W77-00535

THE ECONOMIC WATER SUPPLY IN IDAHO,
Idaho Univ., Moscow. Dept. of Agricultural Economics.
W. C. Bailey, and R. B. Long.
Available from the National Technical Information Service, Springfield, VA 22161, as PB-259 280, Price codes A02 in paper copy, A01 in microfiche. University of Idaho Agricultural Experiment Station, Research Bulletin No. 92, April 1976. 20 p, 8 fig, 9 tab, 17 ref. OWRT A-044-IDA(2). 14-34-0001-5012.

Descriptors: Costs, Economics, *Cost analysis, Unit costs, *Economies of scale, *Regression analysis, Least squares method, *Water supply, Supply, *Elasticity of supply, Prices, *Idaho, Municipal water, Irrigation water, Industrial water.
Identifiers: Supply curve.

Costs involved in making water available for use in Idaho were examined. Making the quantity of water available where needed involves costs for capturing, transporting, and distributing the water supply from existing sources. In examing the cost for making water available for use in Idaho, the water supply industry was segmented into three categories: municipal, industrial, and irrigation. Primary and secondary sources were used in the collection of the data from these three categories. Least squares regression analysis was performed on the data to estimate the relationship between total, fixed and variable costs, and water output for each category. The results of the regression analysis showed there is a reasonably high correlation, 0.70 to 0.81, between cost and output. The economic interpretation of the regression results indicated the water industry in Idaho is in Stage I of a standard production function and subject to economics of scale. In other words, costs of producing water tend to fall as output increases. Supply curves for these water categories were shown to be downward sloping and highly elastic. Results indicated sufficient water is available in Idaho to meet present and foreseeable needs. If past experiences can be used to predict the future, increased demands for water in Idaho can be met by further natural resource development.
W77-00538

ENERGY, WATER, AND THE WEST,
American Association for the Advancement of Science, Washington, D. C.
For primary bibliographic entry see Field 6D.
W77-00542

WATER RESOURCES IN THE WESTERN STATES: PROGRAM POLICY INITIATIVES.
For primary bibliographic entry see Field 6D.
W77-00547

THE PARTICIPATION OF NEW YORK COMMUNITIES IN THE FEDERAL FLOOD INSURANCE PROGRAM,
Cornell Univ. Agricultural Experiment Station, Ithaca, N.Y. Dept. of Rural Sociology.
For primary bibliographic entry see Field 6F.
W77-00671

ECONOMIC AND WATER USE IMPACTS ASSOCIATED WITH ALTERNATIVE WATER PRICING POLICIES OF ESTABLISHED IRRIGATION DISTRICTS,
Oregon State Univ., Corvallis. Dept. of Agricultural and Resource Economics.
For primary bibliographic entry see Field 6C.
W77-00672

NEW TECHNIQUES FOR POLICY EVALUATION IN ECOLOGICAL SYSTEMS: METHODOLOGY FOR A CASE STUDY OF PACIFIC SALMON FISHERIES,
British Columbia Univ., Vancouver. Inst. of Animal Resource Ecology.
R. M. Peterman.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 11, p. 2179-2188, 1975. 5 fig., 16 ref.

Descriptors: *Decision making, *Methodology, *Optimization, *Graphical methods, Ecosystems, *Canada, Management, Alternative planning.
Identifiers: *Nomogram technique, Pacific salmon fishery, *Skeena River(British Columbia).

The nomogram technique to help decision-makers evaluate the relative merits of policy options is described and applied to a salmon management problem. The nomograms provide an instant review of information relevant for making a decision--in effect they are a graphical information retrieval system. They demonstrate certain limits to the ecosystem, allow experimentation with alternative plans merely by moving the plastic overlay with its pointers, and can include constraints on management imposed by desired maximum or minimum limits. In applying this decision-making method to the Skeena River (British Columbia) Pacific salmon fishery, other functions of the nomograms emerged: (1) Trade-offs between components of objectives or goals become readily apparent; (2) the steepnesses of the slopes on the surfaces indicate the degree of deviation from the optimal management policies if they are not exactly achieved; (3) individual value judgments and biases can be used to distinguish relevant impact indicators and their relative importance; (4) measures of resiliency or ability to cope with unexpected changes in the ecosystem can be included; (5) different nomogram surfaces can be combined into one composite either by mathematical weighing and summing or by using plastic overlays. The user can explore the changes in optimum policies caused by using different impact indicators with different weightings, and can assume different economic conditions. (Auen-Wisconsin)
W77-00702

A REGIONAL PLANNING APPROACH TO THE FLOODPLAIN MANAGEMENT PROBLEM,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6F.
W77-00704

THE THEORY OF WELFARE COST MEASUREMENT,
Minnesota Univ., Minn. Dept. of Economics.
J. C. Hause.
Journal of Political Economy, Vol. 83, No. 6, p. 1145-1182, 1975. 2 fig., 2 tab., 55 ref.

Descriptors: *Econometrics, *Welfare(Economics), *Theoretical analysis, Social aspects, Measurement, Estimating.
Identifiers: *Welfare change measurement, Preferences.

Economists have not yet arrived at a consensus about the history, theory and application of welfare cost measurement as based on consumers' surplus concepts, although such measurements are widely used in empirical studies such as those developed for pollution control. In an effort to bridge this theoretical gap, this study attempts to clarify the conceptual framework underlying welfare change measurements. Elements include: (1) welfare change measurements for an individual with known, consistent preferences; (2) estimation of welfare change measures from an individual's demand functions; (3) welfare change measurement for a group of individuals; and (4) measurement of intertemporal welfare change with and without distinct commodities as part of the consumption bundle. To better illustrate key ideas of the theoretical work, use is made of comparisons for alternative consumption opportunities available to an individual with consistent preferences. No normative conclusions are intended as the work focuses on conceptual characterization of net positive (or negative) compensation that would required by one or more individuals with consistent preferences to make one situation utility-equivalent to another. (Harris-Wisconsin)
W77-00709

VALUE OF TIME IN RECREATION BENEFIT STUDIES,
Cornell Univ., Ithaca, N.Y.
F. J. Cesario.
Land Economics, Vol. 52, No. 1, p. 32-41, 1976. 1 tab., 37 ref.

Descriptors: *Travel time, *Evaluation, *Estimated benefits, *Recreation, *Theoretical analysis, Costs, Use rates, Parks, Recreation facilities, Transportation, Northeast U.S.

In studies made to assess primary economic benefits of outdoor recreation, estimation is increasingly made on the basis of consumers' surplus. But because recreation services are free or at negligible prices, demand curves must be imputed from limited price/quantity information. The Hotelling-Clawson-Knetsch method (HCK, or travel-cost technique) is customarily used to impute such recreation site demand curves. But a fundamentalal problem with HCK analysis is the difficulty of fixing the value that consumers of recreation services place on the travel time necessary to reach them. To overcome this problem, a theoretical model of travel-time valuation was developed in which the value of time with respect to nonwork travel was between 1/4 and 1/2 the wage rate. The model was empirically tested on outdoor recreation use data from 11 state parks in the northeastern United States. Benefit estimates were generated under three assumptions: (1) ignoring travel time; (2) using an ad hoc methodology previously developed by Cesario and Knetsch; and (3) valuing travel time according to the newly-developed model. Results showed that benefit estimates from the Cesario model substantially exceeded estimates made when travel time was ignored but were substantially lower than those produced by the ad hoc Cesario-Knetsch method. Further refinements are sought through continued application of the model to empirical studies. (Harris-Wisconsin)
W77-00710

WORKSHOP PROCEEDINGS: CITIZEN PARTICIPATION IN WATER RESOURCES DECISION-MAKING,
Massachusetts Univ., Amherst. Water Resources Research Center.
M. Ertel, and B. Lawson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-259 611, $4.50 in paper copy, $3.00 in microfiche. WRRC Pub. No. 76, Special Report, August 1976, 47 p. OWRT B-036-MASS(2), 14-31-0001-4093.

Descriptors: *Social participation, *Conferences, *Attitudes, Water resources, *Decision-making, *Simulation analysis, Coasts, Water management(Applied).
Identifiers: Gaming simulation, *Citizen participation, *Coastal zone management.

The Water Resources Research Center of the University of Massachusetts has supported through the Office of Water Research and Technology a four-year study of citizen participation in water resources decision-making. One element of this study has supported a workshop on citizen participation focusing on program issues of coastal zone management. This proceedings of the workshop includes (1) the workshop announcement, (2) the workshop materials with opening re-

marks and gaming-simulation guidelines, (3) evaluation report, and (4) list of participants.
W77-00730

ALTERNATIVE FUTURES FOR ENVIRONMENTAL POLICY PLANNING: 1975 - 2000,
Stanford Research Inst., Menlo Park, Calif. Center for the Study of Social Policy.
For primary bibliographic entry see Field 5G.
W77-00768

CONTRACTING FOR SOCIAL IMPACT ASSESSMENT,
For primary bibliographic entry see Field 6G.
W77-00771

A REPORT TO THE NEW ENGLAND RIVER BASIN COMMISSION ON OUTDOOR RECREATION WITH APPLICATION TO THE SUPPLEMENTAL FLOOD MANAGEMENT STUDY OF THE COMPREHENSIVE WATER AND RELATED LAND RESOURCES INVESTIGATION OF THE CONNECTICUT RIVER BASIN. PART V. RECREATION,
Bureau of Outdoor Recreation, Philadelphia, Pa. Northeast Regional Office.
S. R. Speers.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 004, Price codes: A05 in paper copy, A01 in microfiche. Prepared for the New ENgland River Basins Commission, March 1974. 78 p, 15 fig, 3 plates, 9 tab, 21 ref, append. CRS-NERBC-BOR 1.6B (1.1). CRS-NERBC-BOR 1.6B (1.1).

Descriptors: *Recreation, *Reservoirs, *Access routes, *Connecticut River, *Recreation demand, *Recreation facilities, *Reservoir operation, *Water allocation(Policy), Water quality, Water sports.
Identifiers: *New England River Basins Commission, Statewide Comprehensive Outdoor Recreation Plan(SCORP), Wild and scenic rivers, Flatwater recreation resource, Flowing water recreation resource.

In 1972 the New England River Basins Commission (NERBC) requested that the Northeast Region of the Bureau of Outdoor Recreation participate in the Supplemental Study of the Water and Land Related Resources of the Connecticut River Basin. The report discusses supply and demand for selected recreation activities in 1980, 2000 and 2020; and suitability of recreation on flood plain lands; identifies outdoor recreation priorities; summarizes inventories of natural and man-made lakes of 100 acres or more; compares existing demand for and access to boating opportunities and future demand and access to boating; and summarizes recreation streamflow benefits analysis. Recommendations are: local plans developed by Statewide Comprehensive Outdoor Recreation Plans (SCORPs) be accepted and supported; basin states, through their SCORPs continue to provide access and recreation facilities on the water bodies of the Connecticut River Basin; continue studies to identify primary and secondary downstream uses and the effects of controlled release flow on ecology of these streams; optimum recreation potential should be considered when planning for flood plains, local protective works and new impoundments; recreation potential of existing water resource developments should be continually examined to insure maximum use. Recommended priorities are: improve water quality throughout the basin with emphasis on the main stem of the Connecticut River; improve public access to the basins' water; develop water resources responsive to urban pressures; recognize recreation needs at hydro-electric power developments. (Gentry-North Carolina)
W77-00772

GUIDE PLAN REPORT, ANDROSCOGGIN RIVER BASIN, MAINE AND NEW HAMPSHIRE, REGIONAL AND INTERSTATE OVERVIEW.
New England River Basins Commission, Boston, Mass.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 613, Price codes: A05 in paper copy, A01 in microfiche. Prepared for Maine State Planning Office, Draft report NERBC-26, May 1974. 80 p, 16 fig, 5 tab.

Descriptors: *Environmental control, *Environmental effects, *Flood protection, Dams, *Planning, *Water quality, *Flood control, *Decision-making, Flood plains, Fish management, Wildlife management, Recreation, Flood insurance, Land use.
Identifiers: *Androscoggin River Basin(ME-NH), Northern States Guide Plan, North Atlantic Regional Water Resources Study, Lake Umbagog region.

An overview of natural resource issues, problems and opportunities in the Androscoggin River Basin is presented with recommended program priorities to meet these problems. The Northern States Guide Plan program was begun in January 1972. Issues were analyzed in light of the Corps of Engineers' 1972 North Atlantic Regional Water Resources framework study which concluded that the management of the basin reflect its high environmental quality and remoteness. Conclusions referred to: characteristics of the basin influencing the use of water and related land uses; regional and interstate aspects of power, critical environmental areas, recreation, flood damage reduction, and water quality. The status of ongoing water and related land resources data collection, analysis and planning programs is described. Recommendations included: the Oquossoc No. 1 pumped storage power site in ME should not be developed for other uses until New England peak power needs are analyzed; minimum flow requirements and wild and scenic sections should be considered when evaluating potential power sites; alternative means of resource allocation necessary to properly manage the basin's critical areas (especially the Lake Umbagog region) should be investigated; studies should be made of the infrastructure needs, fish and wildlife management program needs, potential resource use conflicts and project priorities in recreation areas; land use controls should be adopted where they do not already exist; requirements should be met for HUD's flood insurance program; the importance of natural streamflow regulation in a basinwide flood damage reduction program should be evaluated. (Gentry-North Carolina)
W77-00774

REGULATION OF COASTAL ZONE DEVELOPMENT FOR FISHERIES MANAGEMENT,
Alabama Dept. of Conservation and Natural Resources, Montgomery.
H. A. Swingle.
Completion Report, June 1976. 21 p, 1 fig, 2 tab. Proj. No. 2-207-R.

Descriptors: *Fish management, *Permits, *Coasts, Fisheries, Marinas, *Alabama, Resources, Management, Sampling, Biology, Environment, Water resources, *Resources development, Wetlands.
Identifiers: Coastal waters, Fisheries management, *Coastal zone development, Environmental protection, East Fowl River(Ala), Heron Bay-Lafitte Bay(Ala).

A summary of activities completed on the federal aid project on regulation of coastal zone development for fisheries management is given. Permit evaluation and guidelines for permit applications are described. Summaries are given of the guidelines for construction in wetlands and coastal waters, specific project guidelines and biological sampling in East Fowl River and Heron Bay - Lafitte Bay. (NOAA)
W77-00891

THE SOCIAL AND ECONOMIC IMPORTANCE OF THE CARONI SWAMP IN TRINIDAD AND TOBAGO,
Michigan Univ., Ann Arbor. Dept. of Natural Resources.
For primary bibliographic entry see Field 6G.
W77-00893

THE SHRIMP FISHERY OF THE SOUTH ATLANTIC UNITED STATES: A REGIONAL MANAGEMENT PLAN.
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
South Carolina Marine Resources Center, Charleston, Technical Report No. 8, June 1975. 73 p. 5 fig., 2 tab, 10 ref. Edited by P. J. Eldridge and S. A. Goldstein. NOAA 03-3-042-29.

Descriptors: *Commercial shellfish, *Shrimp, *Management, South Carolina, North Carolina, Georgia, Florida, Coordination , Costs, *Planning, *Southeast US, *Regional analysis, Atlantic Ocean.
Identifiers: *Regional management, South Atlantic coast.

In order to provide maximum sustained benefits for the region, the proposed shrimp management plan is oriented to the goals of sustaining the fishery so that the catch levels can be maintained at least at the average of the 1955-1970 period until 1980; to identify by 1978 the potential expansion of harvest by better utilization of existing species and exploiting underutilized species; to establish economic criteria by 1978 for evaluating and initiating management action based on social parameters. The core of the plan is a regional catch and effort statistics program which would provide for collection of economic and biological data. This statistical program should have the capability of being expanded to include other fisheries. The principal advantage of this new system is that the management will coincide with the geographical distribution of the shrimp resource. The basic organizational structure of the management system is illustrated and is headed by a Management Council which will set regional policy. Technical Committees with supporting groups would be appointed as necessary. Recommendations for the consideration of the Management Council are listed in the order of priorities. The costs of the management plan are estimated to be approximately $3 million for each five year period. (Auen-Wisconsin)
W77-00918

OPTIMIZING BENEFITS TO URBAN RESIDENTS OF A TOTAL FLOOD WARNING SYSTEM FOR THE BRISBANE VALLEY (AUSTRALIA),
Bureau of Meteorology, Brisbane (Australia). Hydrometeorology Section.
For primary bibliographic entry see Field 4A.
W77-00944

BENEFIT-COST STUDIES IN THE PAHANG RIVER BASIN STUDY (MALAYSIA),
For primary bibliographic entry see Field 4A.
W77-00947

A PLAN FOR MICHIGAN'S SHORELANDS.
Michigan Dept. of Natural Resources, Lansing.
1973. 135 p, 29 fig, 64 photo, 17 tab, 10 ref, 4 append.

Descriptors: *Michigan, *Lake shores, *Erosion control, *Great Lakes Region, *Long-term planning, Analyticial techniques, Evaluation, Flood control, Land management, Shores, Decision making, Forecasting, Environmental effects, Shore protection, Beach erosion, Water law,

Water policy, Regulation, Control, Conservation, Management, Administration, Legislation.
Identifiers: Shoreland planning, Shoreland management.

Pursuant to the Shorelands Protection and Management Act of 1970, the Michigan Department of Natural Resources has developed a broad management program for the use and protection of state shorelands. This program has had to integrate many factors. Examined here are the following: (1) the character of state shorelands; (2) shore erosion and flooding; (3) environmental areas of concern; (4) general shoreland problems; (5) management guidelines; (6) existing regulatory shoreland management techniques; and (7) state and federal shoreland programs. Through numerous photographs and charts, this booklet illustrates the variety of shore problems it is hoped the plan will alleviate or solve. (Reinders-Florida)
W77-00958

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

THE ECONOMIC WATER SUPPLY IN IDAHO,
Idaho Univ., Moscow. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W77-00538

RELATION OF OPERATION AND MAINTENANCE TO TREATMENT PLANT EFFICIENCY,
Environmental Protection Agency, Washington, D.C. Municipal Operations Branch
For primary bibliographic entry see Field 5D.
W77-00582

ECONOMICS OF A FREEZE DESALTING PROCESS USING COLD SEAWATER EFFLUENT OF A LIQUID NATURAL GAS PLANT.
Fluor Engineers and Constructors, Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 3A.
W77-00635

ECONOMIC AND WATER USE IMPACTS ASSOCIATED WITH ALTERNATIVE WATER PRICING POLICIES OF ESTABLISHED IRRIGATION DISTRICTS,
Oregon State Univ., Corvallis. Dept. of Agricultural and Resource Economics.
W. E. Schmisseur.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 559, Price codes: A05 in paper copy, A01 in microfiche. Oregon Water Resources Research Institute, Corvallis, Completion Report WRRI-47, September 1976. 78 p, 40 tab, 13 ref, append. OWRT A-022-ORE(1).

Descriptors: *Linear Programming, *Irrigation districts, *Pricing, Irrigation, Sprinkler irrigation, *Alternative costs, Model studies, *Oregon, Water policy, *Alternative water use, *Economic impact, *Water costs.
Identifiers: *Responsive pricing(Irrigation).

A linear programming model of two diverse, operating irrigation districts in Oregon is used to identify technical and economic effects attributed to fixed cost, base allotment, and responsive water pricing. From this district specific analysis general guidelines are developed relative to water pricing policies and their impacts. Water diversion and peak use were greater with fixed cost pricing than with either base allotment or responsive pricing. For base water allotment pricing to be effective in rationing water use however, the base allotment should be set at a level where variable charges come into play and these charges must be high enough to moderate water use. Relative to fixed cost pricing water costs were appreciably increased and crop returns were reduced with either base allotment or responsive water pricing. With either of these pricing schemes, the highest water cost and greatest reduction in crop returns on an irrigated acre basis were borne by the less water and yield efficient farms. Relative to base allotment pricing, net water revenues of the district were greater with responsive pricing. The smallest range in water cost either on an irrigated acre or acre foot basis occurred with responsive pricing. The smallest range in water cost either on an irrigated acre or acre foot basis occurred with responsive pricing.
W77-00672

GROWN ORGANIC MATTER AS A FUEL RAW MATERIAL RESOURCE,
Ohio Agricultural Research and Development Center, Wooster.
For primary bibliographic entry see Field 3F.
W77-00700

HOUSING DEVELOPMENT CANALS IN THE COASTAL ZONE OF THE GULF OF MEXICO: ECOLOGICAL CONSEQUENCES, REGULATIONS, AND RECOMMENDATIONS,
National Marine Fisheries Service, St. Petersburg, Fla. Environmental Assessment Div.
For primary bibliographic entry see Field 6G.
W77-00701

NEW TECHNIQUES FOR POLICY EVALUATION IN ECOLOGICAL SYSTEMS: METHODOLOGY FOR A CASE STUDY OF PACIFIC SALMON FISHERIES,
British Columbia Univ., Vancouver. Inst. of Animal Resource Ecology.
For primary bibliographic entry see Field 6B.
W77-00702

INTERNATIONAL JOINT VENTURES IN FISHING AND 200-MILE ECONOMIC ZONES,
British Columbia Univ., Vancouver. Div. of International Business Studies.
For primary bibliographic entry see Field 6E.
W77-00707

USE PATTERNS FOR DEPLETABLE AND RECYCLEABLE RESOURCES,
John F. Kennedy School of Government, Cambridge, Mass.
M. C. Weinstein, and R. J. Zeckhauser.
In: 1974 Symposium 'On The Economics of Exhaustible Resources' sponsored by the Review of Economic Studies, p. 67-78. 5 fig., 15 ref.

Descriptors: *Recycling, *Economic efficiency, Model studies, Market value, Interest rates, Resources development, Marginal costs, Optimization, Prices, Mathematical models, Costs.
Identifiers: *Depletable resources.

The question of whether market forces can bring about an optimal amount of recycling is addressed, using a simplified multi-stage model of resources such as iron, aluminum and various heavy metals, which are in limited supply. First a variety of models are examined to see how the significant presence of depletable resources would affect market interest rates. It is concluded these cases can be generalized to the case where interest rates are determined endogenously. Second, several models of markets for recycleable resources are analyzed. These include the following cases: non-depletable resources with zero recycling cost, partially depletable resources with zero recycling cost, recycleable resources with zero extraction costs, recycleable resources with constant marginal extraction costs, and recycleable resources with increasing marginal extraction costs. In the most general case, extraction costs increased with the amount extracted. After an initial period of extraction, a period of coexistence of recycling and extraction activities occured similiar to that of present and projected situations. Capital markets and information were assumed to be perfect and storage costs to suppliers were assumed to be zero in all cases. It is shown in every case that the socially optimal time stream of consumption is identical to the stream produced by perfectly competitive markets. (Luedtke-Wisconsin)
W77-00708

THE THEORY OF WELFARE COST MEASUREMENT,
Minnesota Univ., Minn. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W77-00709

VALUE OF TIME IN RECREATION BENEFIT STUDIES,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 6B.
W77-00710

HARVESTING THE OCEAN--ON LAND,
Alexander Marine Research Facility, Cayucos, Calif.
For primary bibliographic entry see Field 5G.
W77-00718

A SYSTEMS APPROACH TO THE ECONOMICS OF WASTE HANDLING,
Aston Univ., Birmingham (England). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W77-00745

COMPARATIVE COSTS OF EROSION AND SEDIMENTATION CONTROL MEASURES,
Irrigation/Agriculture Engineering-Science, Inc., Berkeley, Calif.
For primary bibliographic entry see Field 4D.
W77-00794

OPTIMAL EXPLOITATION OF MULTIPLE STOCKS BY A COMMON FISHERY: A NEW METHODOLOGY,
British Columbia Univ., Vancouver. Inst. of Animal Resource Ecology.
For primary bibliographic entry see Field 6A.
W77-00920

ENVIRONMENTAL PROTECTION AND SPATIAL ALLOCATION OF INVESTMENTS,
Erasmus Univ., Rotterdam (Netherlands).
For primary bibliographic entry see Field 6G.
W77-00922

AN ECONOMIC ANALYSIS OF THE ENVIRONMENTAL IMPACT OF HIGHWAY DEICING,
Abt Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5C.
W77-00923

A STAGE-DAMAGE CURVE FOR THE BRISBANE RIVER (AUSTRALIA),
Snowy Mountains Engineering Corp., Cooma (Australia).
For primary bibliographic entry see Field 4A.
W77-00943

6D. Water Demand

ISSUES RELATED TO INTERFACING WATER RESOURCE PLANNING WITH LAND USE PLANNING: DEVELOPMENT AND APPLICATION OF QUANTITATIVE PROCEDURES,
INTASA, Menlo Park, Calif.
For primary bibliographic entry see Field 6B.

W77-00526

TECHNOLOGY ASSESSMENT FOR NEW WATER DEVELOPMENT PROJECTS, (VOLUME I),
Virodyne Corp., Littleton, Colo.
For primary bibliographic entry see Field 6B.
W77-00527

THE ECONOMIC WATER SUPPLY IN IDAHO,
Idaho Univ., Moscow. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W77-00538

ENERGY, WATER, AND THE WEST,
American Association for the Advancement of Science, Washington, D. C.
Available from the National Conference of State Legislatures, Ofc. of Science and Technology, Denver, Colo. for $5.00 in paper copy, $3.00 in microfiche. A Workshop Focusing on the Impact of Energy Development on Western Water Resources, November 2-5, 1975, in Albuquerque, New Mexico. Published May 1976, 87 p. Edited by E. R. Gillette, AAAS Publication 76-R-2.

Descriptors: *Energy, *Water demand, *Water resources development, Economic impact, Administrative agencies, Planning, Water management(Applied), Water importing, Water transfer, Water utilization, Costs, Legal aspects, Water supply, Industrial water, *Water requirements, Future planning(Projected).
Identifiers: *Western U. S., *Energy requirements.

The workshop was developed to inform state legislators of the probable impacts of western energy development on western water resources, to facilitate a dialogue between the state policymakers and those principals within the federal agencies that would be formulating the federal programs in this area, to engender effective interstate dialogue, and to determine the extent of knowledge among the western policymakers of the impact that growing energy development would have on present water management programs. A unifying thread in the conference was that the impact of energy development on western water resource is one, if not the most important, factor in energy development and, though it appears that water is available in the western states, it is not in the right place, and in order to be in the right place at the right time, the states and the federal government must cooperatively develop effective policy and programs. The papers and discussion summaries define some of the problems, offer partial solutions and should prove beneficial reading to the state policymaker.(See W77-00543 thru W77-00549)
W77-00542

THE IMPACT OF PROPOSED FEDERAL ENERGY DEVELOPMENT ON WESTERN WATER RESOURCES,
For primary bibliographic entry see Field 4C.
W77-00543

FEDERAL AND STATE GOVERNMENTS, AND THE INDIAN NATIONS: WATER RIGHTS, CONFLICTS, AND POLICIES,
For primary bibliographic entry see Field 6E.
W77-00544

AGRICULTURAL AND ENVIRONMENTAL IMPACTS AS A RESULT OF INCREASED DEMANDS FOR ENERGY DEVELOPMENT,
In: Energy, Water, and the West, November 2-5, 1975, Albuquerque, p 37-43, May 1976. 5 append.

Descriptors: *Rehabilitation, *Environmental engineering, *Energy, *Land management, *Food and cover crops, Agriculture, Food abundance, Coals, Oil shales, Water utilization, Impoundments.
Identifiers: *Extractive use.

Water will be needed for all phases of energy development in western states, including rehabilitation of the areas mainly requires establishing and maintaining native vegetation, while oil shale areas have the problem of salt management. Water is not expected to be a limiting factor in either process. Other significant environmental changes associated with energy development are more significant; these include impoundment, reallocation and extractive use with streams and water supplies. The possible effects of such changes are described, including those on agriculture, livestock and wildlife patterns, and salt buildup with extractive use. The role of energy in the world's food and fiber ecosystems is analyzed. The need for increased food production places greater demands on the already limited water resources in the West. (See also W77-00542) (Jahns-Arizona)
W77-00545

WATER RESOURCE AUGMENTATION IN THE SOUTHWEST.
For primary bibliographic entry see Field 3B.
W77-00546

WATER RESOURCES IN THE WESTERN STATES: PROGRAM POLICY INITIATIVES.
In: Energy, Water, and the West, November 2-5, 1975, Albuquerque, p 55-63, May 1976. 5 append.

Descriptors: *Water resources development, *Water requirements, *Planning, *Water management(Applied), *Water importing, Texas, Colorado, Wyoming, New Mexico, Colorado River Compact, Legal aspects, Water supply, Water demand, Energy, Water transfer, Costs.
Identifiers: Trans-Texas Canal System, Western US.

Water resources planning in Texas, Colorado, Wyoming and New Mexico is discussed by representatives from those states. The Texas Water Plan assumes the state will be water-deficient within the next 50 years and projects importation of 8 to 10 million acre-feet a year using the Trans-Texas Canal System to carry water from the East. Water transported by the canal to Texas and New Mexico would be used mainly for agricultural purposes. Wyoming water laws and interstate compacts are discussed and the Wyoming Water Planning Program outlined. In Colorado, a study by the University of Denver Research Institute analyzes ten methods for reducing or eliminating the water supply/demand gap, including transmountain diversion, construction of new storage facilities, use of groundwater, weather modification and wastewater reuse. The study also presents a methodology for integrating information about additional water needs with techniques available and emphasizes the total cost of each alternative, including indirect economic effects, interest subsidies, social and environmental impacts and legal aspects. Some of these effects are discussed. Water requirements for energy production in New Mexico may constitute 5 to 10% of total projected water needs by 2020. Effects from the Colorado River Compacts are analyzed, along with possible impacts of energy production water use in the state. (See also W77-00542) (Jahns-Arizona)
W77-00547

VIEWS FROM THE ENERGY INDUSTRIES.
In: Energy, Water, and the West, November 2-5, 1975, Albuquerque, p 67-70, May 1976. 5 append.

Descriptors: *Energy, *Industries, *Industrial(Water), *Coals, *Oil shales, *Slurries, Water requirements, Economic feasibility, Colorado, Wyoming, Planning, Water allocation(Policy), Pipelines.
Identifiers: Western U.S., Trans-Texas Canal System, Montezuma Pump-Back Storage Project.

A projected slurry pipeline from Gillette, Wyoming to White Bluff, Arkansas is expected to carry 25 million tons of coal each year starting in 1985. Slurry manufacture is described and its water use and energy-saving features analyzed. In a mine-mouth power plant built in Wyoming, seven times as much water would be evaporated as a slurry pipeline needs for the same amount of coal. Such pipelines use about 15,000 acre-feet of water a year or 20.7 cubic feet per second. Water requirements are substantial for both coal gasification and oil shale development. Many potential coal gasification projects in the West are still seeking a viable water supply. Oil shale developers in Colorado have filed for over 800,000 acre-feet of water in the Colorado and White Rivers; several with senior rights are building conversion works and planning storage reservoir construction. A reliable water source is required before projects will proceed. Issues of public policy must be resolved first on water allocation, interbasin conflicts, water quality, withdrawals for wild and scenic rivers and other problems. The Trans-Texas Canal System and development of the Montezuma Pump-Back storage project (Arizona) are also discussed. (See also W77-00542) (Jahns-Arizona)
W77-00548

NONWATER-INTENSIVE ENERGY RESOURCES.
In: Energy, Water, and the West, November 2-5, 1975, Albuquerque, p 73-76, May 1976. 5 append.

Descriptors: *Water requirements, *Energy, *Electric powerplants, Economic feasibility, Hydrothermal studies, Geothermal studies, Solar radiation, Wind pressure, Winds, Cooling, Energy conversion, Water demand.

Water requirements for solar energy production are analyzed and compared with water consumption patterns for other fossil fuel types of electricity generation. Possible techniques include the use of mirrored surfaces and the photovoltaic approach where sunlight is converted directly to electricity using solar cells, the latter requiring no water. Economic feasibility and possible refinements of the solar cell are discussed. Wind generation is another solar-energy prospect with no water requirement. Geothermal energy has been used commercially only under geologic conditions where heat from the Earth's interior is transported to the surface by convective circulation of steam or very hot water. Natural hydrothermal systems may produce dry steam or, more often, superheated water which contains great quantities of thermal energy. Dry hot rock energy utilization is discussed as a system which may improve as energy is withdrawn from it. More air-cooled power plants may also be developed in the future. (See also W77-00542) (Jahns-Arizona)
W77-00549

A REPORT TO THE NEW ENGLAND RIVER BASIN COMMISSION ON OUTDOOR RECREATION WITH APPLICATION TO THE SUPPLEMENTAL FLOOD MANAGEMENT STUDY OF THE COMPREHENSIVE WATER AND RELATED LAND RESOURCES INVESTIGATION OF THE CONNECTICUT RIVER BASIN. PART V. RECREATION,
Bureau of Outdoor Recreation, Philadelphia, Pa. Northeast Regional Office.
For primary bibliographic entry see Field 6B.
W77-00772

GEOHYDROLOGY AND WATER SUPPLY, SHEYMA ISLAND, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 7C.

W77-00851

AVAILABILITY OF GROUND WATER IN THE AREA SURROUNDING THE TRIDENT SUBMARINE CONSTRUCTION FACILITY, KITSAP COUNTY, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4B.
W77-00862

6E. Water Law and Institutions

THE IMPACT OF PROPOSED FEDERAL ENERGY DEVELOPMENT ON WESTERN WATER RESOURCES,
For primary bibliographic entry see Field 4C.
W77-00543

FEDERAL AND STATE GOVERNMENTS, AND THE INDIAN NATIONS: WATER RIGHTS, CONFLICTS, AND POLICIES,
In: Energy, Water, and the West, November 2-5, 1975, Albuquerque, p 21-34, May 1976. 5 append.

Descriptors: *Federal government, *State governments, *Indian reservations, *Federal-state water rights conflicts, *Water rights, Governmental interrelations, Water resources development, Water policy, Constraints, Jurisdiction, Land management, Energy, Planning.
Identifiers: *Western U.S.

The authority over water rights and water use policies belongs chiefly to the states, but federal government control and influence is increasing. State jurisdiction, interstate policy conflicts, and federal laws which affect surface water resources are discussed. The Bureau of Land Management has generally been concerned with small water developments for livestock, wildlife and watershed purposes, but its role has shifted somewhat toward general management of water resources in cooperation with state officials. The priority in federal water programs is energy rather than other uses such as agriculture. The quantity of water under government control could greatly expand through reserved rights and overcome state policy priorities. Federal-state conflicts in water resource law are discussed, including the issue of Indian lands water jurisdiction. The Supreme Court has consistently ruled that the authority to secure water rights to Indian tribes is contained in the Constitution; lands reserved under these provisions are protected by the Supremacy Clause and not subject to impairment by the states. Indian management of land and water resources is discussed. Cooperative water planning between state, federal and Indian governments is considered crucial. (See also W77-00542) (Jahns-Arizona)
W77-00544

REGULATIONS: REACTIONS AND RESOLUTION,
Environmental Protection Agency, Washington, D. C., Office of Water and Hazardous Materials.
For primary bibliographic entry see Field 5G.
W77-00615

LIST OF PAPERS, 1967/1975, (INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH).
International Association for Hydraulic Research, Delft (Netherlands).
For primary bibliographic entry see Field 10C.
W77-00636

PLANNING LEVEL AND PROGRAM IMPACT STATEMENTS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT: A DEFINITIONAL APPROACH,
California Univ., Los Angeles. School of Law.
For primary bibliographic entry see Field 6G.
W77-00705

INTERNATIONAL JOINT VENTURES IN FISHING AND 200-MILE ECONOMIC ZONES,
British Columbia Univ., Vancouver. Div. of International Business Studies.
J. W. C. Tomlinson, and I. Vertinsky.
Jounral of the Fisheries Research Board of Canada, Vol. 32, No. 12, p. 2569-2579, 1975. 1 tab., 50 ref.

Descriptors: *Marine fisheries, *Jurisdiction, *Participating funds, *Investment, Exploitation, Decision making, Africa, South America, Industries, Foreign countries.
Identifiers: *Joint fishing ventures, 200-mile zones, Sovereign waters, Foreign investment.

Various strategies that may be adopted by coastal nations for utilization of fishery resources under a system of 200-mile economic zones are examined. The benefits and problems that are likely to arise out of alternative approaches, such as a do-nothing strategy, independent operation, licensing, foreign subsidiaries, and joint ventures are discussed. A form of joint venture has the greatest potential for success in achieving both effective utilization of resources and beneficial development of the underdeveloped coastal nations. Because of the inputs of resources, technology, and access to markets by the foreign partner, the joint operation not only generates revenues, but the costs of developing the fishery are more than covered, thus avoiding or reducing the need for development subsidies. A joint operation provides a prescribed control and indirectly creates externalities favorable to related and dependent activities. A necessary condition of joint participation is the inclusion of local technical and managerial personnel to generate a skilled base in the host country. For those coastal nations lacking effective domestic naval policing ability, the growth of a fishing fleet generates the growth of a merchant marine capability as the base for an operational naval force. The institutionalization of joint ventures in fishing would also serve as a foundation to resolve problems during exploitation of sea-bed mineral resources. (Auen-Wisconsin)
W77-00707

ENVIRONMENTAL MANAGEMENT IN THE MALIBU WATERSHED: INSTITUTIONAL FRAMEWORK,
California Univ., Los Angeles. School of Architecture and Urban Planning.
For primary bibliographic entry see Field 6G.
W77-00769

MARINE AND ESTUARINE SANCTUARIES. PROCEEDINGS OF THE NATIONAL WORKSHOP ON SANCTUARIES, 28-30 NOVEMBER 1975, WASHINGTON, D. C.,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 2L.
W77-00888

REPORT TO THE CONGRESS ON OCEAN DUMPING RESEARCH, JANUARY THROUGH DECEMBER 1975.
National Oceanic and Atmospheric Administration, Washington, DC.
For primary bibliographic entry see Field 5G.
W77-00892

MARINE POLLUTION ARTICLES IN THE LAW OF THE SEA SINGLE INFORMAL NEGOTIATING TEXT,
Rhode Island Univ., Kingston. Law of the Sea Inst.
For primary bibliographic entry see Field 5G.
W77-00894

WISCONSIN NATURAL RESOURCE USE CONTROLS AND ASSISTANCE.
Wisconsin Dept. of Natural Resources, Madison.
Publication No. 3-8800, 1975. 18 p, 14 tab.

Descriptors: *Administrative agencies, *Regulation, *Water resources development, *Land development, Law enforcement, Flood plain zoning, Permits, Water quality, Air pollution, Potable water, Environment, Solid wastes, Forestry, Wildlife, Fisheries, Conservation, Recreation, Tourism, Industrial wastes.

The organizational structure--by divisions, bureaus, and sections--and the various functions of the Wisconsin Department of Natural Resources that may affect the construction of a land development and/or water development project are listed. The Division of Enforcement's duties are to plan and direct a coordinated program of law enforcement encompassing all enforcement responsibilities with regard to the environment, fish and game violations, water management, zoning matters, air pollution control and solid waste management, park and recreation areas, and forestry. The Division of Environmental Standards is responsible for establishing and enforcing standards which are intended to maintain and improve the quality of air, land, and water of the state. The Division of Forestry, Wildlife and Recreation plans and coordinates the development, protection and utilization of forest, fish and game resources; other wild plants and animals, other outdoor recreation resources and the wild rivers program. Charts for each division describe its function and legislative statute, authority requirement for a proposed construction, whether a public hearing or public notice is required, defines the applicant (defendant), and prescribes the permit issuing office (if required), and give information sources. (Auen-Wisconsin)
W77-00915

THE CANADA WATER ACT, ANNUAL REPORT, 1974-1975.
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W77-00916

OPTIMAL TAXATION POLICIES FOR CONSERVATION AND RECYCLING,
Florida Univ., Gainesville. Dept. of Economics.
For primary bibliographic entry see Field 6G.
W77-00921

FLOOD STANDARDS - THE ROLE OF ENGINEERING INSTITUTIONS,
Binnie and Partners, Melbourne (Australia).
For primary bibliographic entry see Field 6F.
W77-00935

THE INTERNATIONAL LAW OF THE SEA: A CASE FOR A CUSTOMARY APPROACH,
South Carolina Univ., Columbia. School of Marine Science.
E. W. S. Hull.
University of Rhode Island, Kingston, Law of the Sea Institute, Occasional Paper No 30, April 1976. 17 p.

Descriptors: *Law of the Sea, *Governmental interrelations, *International waters, *Resources development, Military aspects, Navigation, Foreign countries, Organizations, United Nations, Resource allocation, Water law, Regulation, Planning, International law, Oceans, Water policy, Institutional constraints, Jurisdiction, Conferences, Treaties, Foreign waters, Legal aspects, Federal government, Governments, International commissions.
Identifiers: Coastal zone management, Territorial seas(Jurisdiction).

Despite nearly a decade of effort, progress towards agreement on a new Law of the Sea (LOS) Convention has been extremely slow. This paper notes the diversity of perspectives among the participants, describes the basic issues, and suggests policy changes for the United States. The wisdom of a purely conventional approach to the development of a new LOS is examined. It is suggested that a totally different approach, one which is pragmatic and has its origins in customary law, is needed. While there are many alternative approaches to initiation of customary LOS evolutionary processes, several recommendations are made to demonstrate a new policy approach, including: (1) proclamation of a 12-mile territorial sea for the U. S.; (2) proclamation of a 200-mile economic zone; (3) recognition of the archipelago principle; (4) enactment of enabling legislation to permit the commencement of undersea mining operations; (5) declaration of a national policy opposing the dumping of hazardous materials in the ocean; and (6) the obtaining of maximum freedom for scientific research. (Reinders-Florida)
W77-00956

1974 ANNUAL REPORT, (WASHINGTON NATURAL RESOURCES AND RECREATION AGENCIES).
For primary bibliographic entry see Field 5G.
W77-00957

A PLAN FOR MICHIGAN'S SHORELANDS.
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 6B.
W77-00958

NONPOINT POLLUTION: AN EPA VIEW OF AREAWIDE WATER QUALITY MANAGEMENT,
Environmental Protection Agency, Washington, D. C. Water Planning Div.
For primary bibliographic entry see Field 5G.
W77-00959

NONPOINT POLLUTION AND WATER QUALITY MONITORING,
Georgia Univ., Athens. Inst. of Community and Area Development, and Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 5G.
W77-00960

INSTITUTIONAL ARRANGEMENTS FOR LAKE MANAGEMENT IN WISCONSIN,
Wisconsin Univ., Madison. Environmental Resources Unit.
L. Klessig.
Journal of Soil and Water Conservation, Vol 31, No 4, p 152-55, July-August 1976. 4 p, 1 photo, 1 chart, 16 ref.

Descriptors: *Water management(Applied), *Wisconsin, *Lakes, *Local governments, *Reservoirs, State governments, Legal aspects, Political aspects, Water resources, Water resources development, Zoning, Natural resources, Water supply, Water requirements, Water utilization, Water control, Legislation, Grants.
Identifiers: *FWPCA Amendments of 1972, *Inland Lake Demonstration Project.

Lakes and reservoirs are a major public resource. As such, they require active management by a capable legal authority. In some regions, federal or state agencies may best be able to assume the lead role. In regions with many lakes, a local unit may be more appropriate. Through recent legislation, Wisconsin has provided a mechanism by which localities can become responsible for their own lakes. Chapter 33 of the Wisconsin Statutes is the enabling authority for such local control. Under Chapter 33, the state and federal governments will provide funds for such localities for lake and reservoir management. Furthermore, because of the state program, Wisconsin has managed to obtain a large share of federal allotment under the FWPCA Amendments of 1972. Chapter 33 became reality through the work of the Inland Lake Demonstration Project, which spent years educating the people of the state as to the need for such legislation. Hopefully other states will follow Wisconsin's lead. (Frank-Florida)
W77-00966

NEW FEDERAL REGULATIONS FOR DREDGED AND FILL MATERIAL,
Smith (David D.) and Associates, San Diego, Calif.
For primary bibliographic entry see Field 5G.
W77-00967

MODEL FOR A STUDY,
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 2L.
W77-00971

PAYING TO POLLUTE.
For primary bibliographic entry see Field 5G.
W77-00972

PIANC,
National Water Resources Association, Washington, D. C.
C. H. Bronn.
Water Spectrum, Vol 7, No 4, p 30-36 Winter 1975-76. 7 p, 3 map, 6 photo.

Descriptors: *Conferences, *International commissions, *Navigation, *Information exchange, Publications, Waves, Engineering structures, Docks, Coastal structures, Planning, Navigable waters, Ships, Dredging, Environmental effects, Water policy, Harbors, Locks, Maps, Multiple-purpose projects, Governments, Federal government, Legal aspects, International law.
Identifiers: Coastal zone management, Comparative law, Coastal waters.

Toward the close of the 19th century, when a number of governments agreed that common navigational interests merited an international exchange of ideas, the Permanent International Association of Navigation Congress (PIANC) was formed. This article explains the organization, functions, and goals of PIANC. PIANC affords high level professionals, chosen for their diversity of training and experience, an opportunity to meet and exchange technical and professional information among national policy makers. PIANC actions are directed by a Permanent International Commission (PIC) appointed by the member governments. The quadrennial congresses are preceded by the publication of professional papers on subjects selected by the PIC. Five PIANC commissions are currently at work in the following areas: sports and pleasure navigation; waves; reception of large ships; locks, ship lifts and river weirs; and environmental effects of dredging and the disposal of dredged materials. (Reinders-Florida)
W77-00976

THE SELLING OF THE SHELF,
For primary bibliographic entry see Field 5G.
W77-00979

CORPORATE RESPONSIBILITY IN SILVER BAY,
For primary bibliographic entry see Field 5G.
W77-00980

DECISION TO LEASE OUTER CONTINENTAL SHELF LANDS,
Massachusetts Energy Policy Office, Boston.
H. Lee.
Coastal Zone Management Journal, Vol 2, No 1, p 31-46 (1975). 16 p, 31 ref.

Descriptors: *Continental shelf, *Mineral industry, *Decision making, *Oil fields, *Long-term planning, Short-term planning, Oil spills, Oil wells, Oil industry, Oil, Natural gas, Leases, Bids, Exploration, Exploitation, Geologic formations, Geological surveys, Offshore platforms, Coasts.
Identifiers: *Coastal waters.

The piecemeal process by which the United States is developing its offshore resources can be improved by greater cohesion in planning and development procedures. Currently each resource is usually considered in isolation. For example, one group of policy makers will be concerned with oil, another with fishing, and a third with pollution. The author suggests that the decision to lease areas of the Outer Continental Shelf for purposes of oil exploration was principally determined by the form of the decision making process, rather than by a rational analysis of economic and political factors. The author favors a plan put forth by Senator Hollings of South Carolina, which would do away with the piecemeal approach of leasing tract by tract. Instead, percentage shares of entire geological structures would be leased. No joint bidding would be allowed. A party could bid up to 20% of the total interest in that structure. Bids would be awarded on the highest dollar value per one percent interest. Combined geologic studies would enable the coastal states to assess the impact of drilling on the basis of hard information. As a result coastal states would have the chance to establish management structures necessary to protect their existing economic and environmental resources. (Frank-Florida)
W77-00981

SHORELINE EROSION: IMPLICATIONS FOR PUBLIC RIGHTS AND PRIVATE OWNERSHIP,
P. Burka.
Coastal Zone Management Journal, Vol 1, No 2, p 175-195 (1974). 21 p, 93 ref.

Descriptors: *Public rights, *Erosion control, *Beach erosion, *Shore protection, *Public access, Public benefits, Public lands, High water mark, Erosion, Common law, Civil law, Easements, Prescriptive rights, Water law, Shores, Beaches, Legal aspects.

Public beach access rights and the erosion of the ocean shoreline have each been identified as major coastal zone problem areas. There is a close relationship between the two. Suggested here are certain concepts that should be universally adopted to make beach regulation more coherent and cohesive. Different states have different theories concerning public beach access rights. They range from public ownership from the mean high tide line all the way up to the vegetation line. Where erosion of the shoreline is concerned, there are problems in determining what actions one landowner may take to protect his beach since his actions may result in damage to an adjacent landowner. Some states say that one may protect one's land, but not at the expense of adjacent landowners. Others follow the Common Enemy doctrine, which allows greater latitude in protection even at another's expense. The erosion problem presents another question. Under what theory does the public have a right to prevent erosion, and to what land does the public have a right when erosion occurs. The author answers these questions by calling for the adoption of the concept of a 'rolling easement'. Any universal concept concerning beach law, however, is far from a reality. (Frank-Florida)
W77-00982

ORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY--EFFLUENT

LIMITATIONS, GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-00983

ENVIRONMENTAL PROTECTION AND ENHANCEMENT (GENERAL GUIDANCE TO ELEMENTS WITHIN THE DEPARTMENT OF THE ARMY ON ENVIRONMENTAL PROTECTION).
Office of the Cheif of Engineers (Army), Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-00984

OCEAN DUMPING; PROPOSED SITE DESIGNATION.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-00985

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM AND STATE PROGRAM ELEMENTS NECESSARY FOR PARTICIPATION.
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-00986

TRAIN V COLORADO PUBLIC INTEREST RESEARCH GROUP, INC. (CONFLICT OF FEDERAL WATER POLLUTION CONTROL ACT AND THE ATOMIC ENERGY ACT).
96 5Ct 1938-49 (1976). 10 p.

Descriptors: *Radioactive wastes, *Water quality standards, *Jurisdiction, *Permits, *Federal Water Pollution Control Act, Navigable waters, Pollutants, Judicial decisions, Administrative agencies, Governmental interrelations, Nuclear powerplants, Radioisotopes, Nuclear wastes, Federal government, Regulation, Standards, Water pollution, Legislation.
Identifiers: Licenses.

Plaintiff organization brought suit to compel defendant federal agency to control the discharge into navigable waters of radioactive effluents from two nuclear power plants. Plaintiff contended that the defendant had a non-discretionary duty under the Federal Water Pollution Control Act (FWPCA) to control such discharge and that the defendant failed to perform said duty. The defendant asserted that the authority to regulate discharge of radioactive materials lay wholly with the Atomic Energy Commission (AEC). The trial court granted summary judgement for the defendant. The appellate court reversed. The Supreme Court of the United States held for the defendant, finding that the defendant's determination that source, by-product, and special nuclear materials were not 'pollutants' within the meaning of the FWPCA. The Court determined that the legislative intent was that the FWPCA permit program cover only those materials beyond AEC juristiction, such as radium and accelerator produced isotopes. The Court also determined that the AEC retains full authority to regulate materials covered by the Atomic Energy Act to the exclusion of any other agency. (Capehart-Florida)
W77-00987

UPPER NIOBRARA RIVER COMPACT.
Wyo Stat Ann secs 41-512.5 thru 41-512.6 (Supp 1971).

Descriptors: *Wyoming, *Interstate compacts, *Equitable apportionment, *Surface-groundwater relationship, *State governments, Surface waters, Groundwater, Nebraska, Data collections, Regulation, Governmental interrelations, Gaging stations, Reservoirs, Diversions, Surveys, Beneficial use, Interstate rivers, Irrigation, Surface water availability, Water supply, Water resources, Groundwater resources.
Identifiers: *Upper Niobrara River Compact(Wyo-Neb).

The Upper Niobrara River Compact, a compact between Wyoming and Nebraska, has been ratified by the state of Wyoming. The compact governs apportionment between the states of the surface water supply of the river basin. The compact specifies the limitations on use of surface waters to be imposed on Wyoming as the upstream state. It further provides for a study of the groundwater flow since use of groundwater in the basin may deplete the surface flow in the river. Apportionment of the groundwater maybe done later by supplementing the compact. If, as a result of the study, groundwater apportionment is not deemed necessary, further analyses shall be required at two-year intervals until such apportionment is made. (Capehart-Florida)
W77-00988

OBSTRUCTING BRIDGES OR STREAMS.
Wyo Stat Ann sec 35-479 (Supp 1971).

Descriptors: *Wyoming, *Obstruction to flow, *Bridges, *Streams, *Legislation, Legal aspects, State governments, Highways, Roads, Running waters, Lakes, Ponds, Bodies of water, Marshes, Sewers, Water quality control, Water pollution, Water pollution control, Water law, Reasonable use, Barriers.

In the state of Wyoming, any person, company or corporation violating the prohibition against obstructing or injuring highways, streets, bridges or streams shall, upon conviction, be fined up to one hundred dollars. Fines will also be levied for erecting or establishing any trade or business which obstructs or pollutes any water course, lake, pond, marsh or common sewer. (Cowart-Florida)
W77-00989

GARBAGE POLLUTION, DISPOSAL INTO STREAMS.
Wyo Stat Ann secs 35-462 thru 35-464 (Supp 1971).

Descriptors: *Organic wastes, *Wyoming, *Waste disposal, *Domestic wastes, *Water quality control, Legislation, Legal aspects, Streams, Rivers, Disposal, Irrigation ditches, Lakes, Surface waters, Subsurface waters, Water pollution sources, Solid wastes, Wastes, Public health, Pollutants, Water policy, Water law.

The state of Wyoming prohibits the pollution or impairment of the purity and usefulness of the waters of any spring, reservoir, stream, irrigation ditch, lake or other water supply (surface or subterrarean) if those waters are used wholly or partly as a source of public or domestic water supply. The following causes of water impairment are specifically prohibited: depositing or placing the carcass of any dead animal, or the offal or refuse matter from any slaughter house, meat market or the like; depositing any spoiled meats or fish, or any animal or vegetable matter in a putrid or decayed condition; and depositing any refuse or garbage or offensive matter. An exception to this latter prohibition is made for municipal sewage and garbage disposal systems. The throwing or placing of sawdust from a sawmill into any river, stream, creek, bay, pond, lake, canal, ditch or other water course is specifically proscribed. (Cowart-Florida)
W77-00990

PROTECTION OF PUBLIC WATER SUPPLY.
Wyo Stat Ann secs 35-184 thru 35-200 (Supp 1971).

Descriptors: *Wyoming, *Water pollution control, *Public health, *Water policy, *Legislation, Legal aspects, State governments, Water purification, Potable water, Quality control, Water quality, Water pollution treatment, Water resources, Streams, Lakes, Ponds, Bodies of water, Aquatic life, Crops, Fish, Livestock, Wildlife.

The Wyoming state department of public health shall have general supervisory powers over all inland waters and over all streams, lakes, and ponds used by any city, town or public institution. The department shall also supervise the waters used by any water or ice company as sources of water supply for domestic use with respect to their condition as it affects the public health. Any pollution which adversely affects livestock, agricultural crops, wildlife, fish or aquatic life is also deemed to affect public health. The board of health shall examine waters to determine their purity and fitness for domestic use, and shall make rules to prevent pollution and secure protection for waters. Sewage is to be purified before it is discharged. Industrial plants shall protect the water supply by taking such sanitary precautions as shall be approved by the state board of health. Administrative procedures for filing complaints and conducting investigations as to pollution are set forth. (Cowart-Florida)
W77-00991

PROTECTION OF AQUATIC WILDLIFE.
Utah Code Ann secs 23-15-3 thru -6 (Supp 1975).

Descriptors: *Utah, *Fish, *Fish conservation, *Wildlife conservation, *Regulation, Legislation, Screens, Administrative agencies, State governments, Rivers, Water pollution, Aquatic environment, Aquatic insects, Wildlife management, Diversion, Water works, Powerplants, Habitat improvement.
Identifiers: Wildlife resources, Water draining.

Utah has enacted legislation making it unlawful for any person to divert water which will endanger protected aquatic wildlife in the state. Furthermore those who take any water from state streams, lakes or reservoirs for power purposes must furnish screens to prevent fish from entering powerplants or water works systems. Also, any person controlling a waterway leading to a state waterway containing protected aquatic wildlife who desires to drain or divert such waterway, thereby endangering wildlife shall give written notice to the Division of Wildlife Resources. Polluting any waters deemed necessary for wildlife purposes by the wildlife board, or any waters containing protected wildlife is also unlawful. Finally, unless authorized, no person may take any protected aquatic wildlife or wildlife eggs in any state waters. (Lauer-Florida)
W77-00992

STATE V ASHMORE (FIXING BOUNDARIES ADJACENT TO TIDEWATERS).
224 SE2d 334-47 (Ga 1976). 14 p.

Descriptors: *Georgia, *Boundaries(Property), *Intertidal areas, *Accretion(Legal aspects), Land tenure, Low water mark, Oysters, Clams, Riparian rights, Tidal waters, Adjacent land owners, Ownership of beds, Navigable waters, Legal aspects, Aquiculture, Shellfish farming, Beaches, Shores, Public rights, State governments, Legislation, Constitutional law, Judicial decisions, High water mark.
Identifiers: Public trust doctrine.

Plaintiff state of Georgia brought suit against defendant landowners to determine the ownership of the foreshore and of the land accreted above the high water mark. In 1902 the high water mark was judicially determined to be the boundary for ocean front property. The legislature then enacted a statute to extend the boundary to the low water mark, reserving certain rights of navigation to the

public. The statute was ratified by the 1945 constitution. The state contended that such ratification was ineffective and the original statute unconstitutional. The Supreme Court of Georgia held that the 1902 act was constitutional; however, the effect of the act was to vest fee simple title to the foreshore in the state with the exclusive right to plant, cultivate, and harvest oysters and clams within the foreshore area reserved to the adjacent landowners. Addressing the issue of ownership of land accreted from navigable tidewaters, the court held that such lands accrue to the adjacent landowner. Two dissenting justices felt that the 1902 act set the seaward boundary at the low water mark. (Capehart-Florida)
W77-00993

DIZE AWNING AND TENT CO V WINSTON-SALEM (RIGHT TO INCREASE RATE OF FLOW FROM CREEK WATERSHED UNDER EASEMENT OF SERVITUDE).
224 SE2d 257-60 (NC Ct App 1976).

Descriptors: *North Carolina, *Drainage systems, *Storm runoff, *Negligence, *Natural flow, Culverts, Pipes, Drains, Streams, Cities, Watersheds, Surface waters, Land tenure, Structures, Surface drainage, Roads, Conveyance structures, Floods, Runoff, Storm drains, Obstruction to flow, Alteration of flow, Judicial decisions.

Plaintiff landowner sought to recover compensation from defendant city for flood damage. The plaintiff owned property through which a small creek flowed and which was downstream from the city's drain culverts. The plaintiff installed 24 in. and 36 in. drainage pipes to contain the creek waters and permit construction of buildings on the property. In 1960, the city replaced its original 30 in. pipes with 42 in. pipes. After this, the plaintiff experienced flooding problems caused by blockage of his pipes with large debris. The plaintiff contended that the city had a duty to install protective devices to prevent debris from blocking its pipes. The trial court directed a verdict for the defendant. The Court of Appeals of North Carolina affirmed, holding that the defendant had acted properly in that it had only accelerated the volume and flow of water in the stream and had not diverted the course of the creek. The court stated that liability would not be imposed on the defendant simply because the plaintiff's drainage system was inadequate to handle the increased flow caused by the defendant's larger drain pipes. (Capehart-Florida)
W77-00994

NORMAN AND SCHAEN, INC V DALLAS (WITHOUT CAUSING INCREASE IN WATER FLOW ACROSS PROPERTY, CITY NOT RESPONSIBLE FOR FAULTY DRAINAGE SYSTEM).
536 SW2d 428-31 (Tex Ct Civ App 1976). 4 p.

Descriptors: *Texas, *Storm drains, *Storm runoff, *Negligence, *Floods, Natural flow, Drains, Streams, Cities, Watersheds, Surface waters, Structures, Surface drainage, Runoff, Drainage systems, Obstruction to flow, Alteration of flow, Legal aspects, Judicial decisions, Flood damage, Compensation.

Plaintiff occupants of a building that was flooded sought compensation from defendant city for water damage to the contents of the building. Within a one-month period plaintiffs' warehouse area was flooded twice; first to a height of 19 inches, then to 28 inches. The building was located directly over a storm sewer which had been constructed by the city along the course of a creek. Plaintiffs contended that the defendant was negligent in failing to provide a storm sewer of sufficient size to handle the storm waters. The Court of Civil Appeals of Texas, affirming the verdict for the defendant, held that the city had no legal responsibility to maintain adequate drains. Stating that partial protection is better than none, the court said that the magnitude of flood protection provided is within the discretion of the city. Although a city may not increase the flow of surface waters across land, it has no duty to prevent all flooding caused by the natural drainage patterns of the watershed. (Capehart-Florida)
W77-00995

GARDNER V HAMILTON (RIGHT TO EXERCISE EMINENT DOMAIN FOR FLOOD CONTROL).
536 SW2d 422-25 (Tex Ct Civ App 1976). 4 p.

Descriptors: *Texas, *Eminent domain, *Easements, *Flood control, *Condemnation, Legislation, Legal aspects, Flood protection, Land tenure, Strucutes, Control, Water control, Cities, Water conservation, Judicial decisions.
Identifiers: Injunctive relief.

Plaintiff landowners sought to vacate an easement on 5.9 acres of their 7.77 acre tract granted by them to defendant city for flood control purposes. The plaintiffs further sought to enjoin construction of a water conservation structure on their property. The city filed a cross action to declare the easement valid or alternatively to condemn the property. The trial court set aside the easement and gave title to 5.68 acres to the city under eminent domain, requiring payment of $9806. The plaintiffs appealed, contending that the city did not have the power of eminent domain for the purpose of flood control and further contending that the proper procedures for condemnation had not been followed. The Court of Civil Appeals of Texas affirmed the trial court decision. The court held that flood control and water retention are proper purposes for the exercise of eminent domain. Furthermore, when the title to land is in dispute, the condemnor is not required to follow the same procedure as in an initial condemnation proceeding. (Capehart-Florida)
W77-00996

MC CLELLAN V JANTZEN (STOCKING OF FISH NOT AN ACT OF APPROPRIATION GIVING VESTED RIGHT IN WATER STOCKED).
547 P2d 494-97 (Ariz Ct App 1976). 4 p.

Descriptors: *Lakes, *Arizona, *Judicial decisions, *Prior appropriation, *Fish, *Stocking, Water users, Water rights, Dams, Reservoirs, Water resources, State governments, Drainage effects, Drainage.

Plaintiff was a prior appropriator of water from an aritificial lake who sought an injunction to stop the stocking of fish therein by defendant State Game and Fish Department. The legal issue was whether the act of stocking the reservoir with fish would constitute an act of appropriation requiring a permit from the State Land Department. While the appropriation of water for fish was added to the Arizona statutory body in 1962, the act of stocking fish was never intended to constitute an appropriation of that water. Rather, the statute gives the Department the authority to stock fish without appropriating of any water. Furthermore, the State Game and Fish Department contended that unappropriated waters existed in the lake. The court refused to rule on this question, however, saying instead that it was a matter for the State Land Department. It was conceivable, should no unappropriated water be found, that the lake owner could drain the lake and thus kill all the stocked fish. In that event, said the court, there would be no cause of action against him. In short, given an adverse ruling by the State Land Department, the Game and Fish Department was taking its chances by stocking the lake. (Frank-Florida)
W77-00997

SALT RIVER VALLEY WATER USERS' ASSOCIATION V GIGLIO (DUTY OF REASONABLE CARE IN DISPOSING OF FLOODWATERS ENTERING CANAL SYSTEM).
549 P2d 162-76 (Ariz 1976). 15 p.

Descriptors: *Flood routing, *Floodways, *Judicial decisions, *Canals, *Bridge design, Flood protection, Flood damage, Flood control, Flood discharge, Legal aspects, Negligence, Drainage, Drainage area, Drainage systems, Damages, Bridges, *Arizona, *Water users.
Identifiers: Salt River Valley Water Users' Assoc.

Plaintiff homeowners brought an action against the Salt River Valley Water Users' Association to recover compensatory and punitive damages for flooding of their property due to breaches in an irrigation canal operated by the association. After a 1.1 million dollar jury verdict, the defendant Association appealed to the Arizona Supreme Court, claiming that the evidence was insufficient to support a jury finding of negligence and that punitive damages were unwarranted. After reviewing the trial transcript, the Supreme Court ruled that the evidence was sufficient. The court found that several available waterways were not opened in time to relieve pressure caused by the increased water flow, and that a bridge was constructed so low so as to force the water into increased velocity to pass under it. Although not absolutely liable, the Association did owe a reasonable duty of care to those under its protection; further, a jury could have found that this care was not exercised. The fact that plaintiffs constructed their homes on a noted drainage tract was held insufficient to bar an action for recovery. Punitive damages, however, were denied because of a lack of wanton, malicious or oppressive conduct. (Frank-Florida)
W77-00998

GOWING V MC CANDLESS (CROP DAMAGE RESULTING FROM FLOODING OF OBSTRUCTED WATERCOURSE).
547 P2d 338-44 (Kan 1976). 7 p.

Descriptors: *Kansas, *Legal review, *Flood damage, *Ditches, *Timber piles, Damages, Judicial decisions, Crops, Overflow, Flood flow, Floods, Banks, Water levels, Water control.
Identifiers: Statute of Limitations.

Plaintiff landowners brought an action to recover for crop damage caused by water overflow stemming from an alleged obstruction of a watercourse by defendant lower landowners. During timber-clearing operations, the defendants obstructed a natural ditch with trees and dirt which prevented the drainage of land, thus damaging plaintiffs' crops. After the trial court found for the plaintiffs, the defendants appealed, contending that the action had not been brought within the applicable two year statute of limitations. The Kansas Supreme Court held that where an injury or wrong is classified as not original or permanent, but as temporary, transient or recurring, each injury causes a new cause of action to accrue, at least until the injury becomes permanent. Since the crop damage occurred every year for a period of years, and evidence had been introduced showing that the obstructions could have been removed at any time, the court ruled that the injury was temporary and recurring. Therefore, in the absence of permanent damages, the action claiming crop damages did not have to be brought within the two year statute of limitations, and was timely filed. The original verdict for damages was upheld. (Frank-Florida)
W77-00999

WATERSHED IMPROVEMENT DISTRICTS.
Wyo Stat Ann secs 41-354.1 thru 41-354.26 (Supp 1971).

Descriptors: *Wyoming, *Water districts, *Watershed management, *Local governments, *Watersheds(Basins), Erosion, Flood protection, Sedimentation, Water storage, Water conserva-

tion, Water utilization, Water resources, State governments, Legislation, Real property, Eminent domain, Structures, Bond issues, Appraisals, Water resources development.
Identifiers: Public hearings.

Watershed improvement districts may be formed in Wyoming to prevent and control erosion, floodwater, and sedimentation damages and to store, conserve, develop, utilize and dispose of water so as to protect land and water resources. Watershed improvement districts may be formed as sub-districts of a soil and water conservation district. They may also be located in more than one soil and water conservation district. Public hearings on the feasibility of establishing a proposed watershed improvement district are required, followed by a referendum within the proposed district. Additional territory may be added to an existing district without a referendum if there are less than ten landowners involved. The board of directors of a district shall have the power to: levy and collect assessments for special benefits; acquire and sell real or personal property; condemn private property through eminent domain; and, construct and operate any necessary structures. (Capehart-Florida)
W77-01000

LAKE WASHINGTON SHIP CANAL,
Wash Rev Code Ann sec 37.08.240 (1964).

Descriptors: *Washington, *Legal aspects, *Federal government, *Canal construction, *Canals, Canal design, Construction, Transportation, Ships, Damages, Channels, Channeling, Conduits, Excavation, United States, Spillways.
Identifiers: *Puget Sound(Wash), *Lake Washington Ship Canal(Wash).

The Federal government was planning to construct a connecting canal between Lake Union, Lake Washington and Puget Sound in the state of Washington. This Washington legislation granted the United States the right to build and operate the Lake Washington ship canal along with the necessary spillways, buildings, power plants and landways. It also granted the right to lower the waters of Lake Washington and raise the level of Salmon Bay. The United States was released from all liability to damages to this state that could arise from the lowering or raising of the waters. (Frank-Florida)
W77-01001

1971 WATER RESOURCES ACT.
Wash Rev Code Ann secs 90.54.010 thru 90.54.070 (1975).

Descriptors: *Water resources, *Legislation, Data collections, Beneficial use, Water allocation(Policy), Water utilization, Waste water disposal, Data storage and retrieval, Ecology, *State governments, Base flow, Rivers, Streams, Fish, Wildlife conservation, Impoundments, *Washington.

The Washington legislature adopted the following broad guidelines as part of its 1971 Water Resources Act: (1) uses of water for statutorily specified purposes are considered beneficial; (2) allocation of water among potential users shall be based on the securing of maximum net benefits for the people of the state; (3) all rivers and streams shall retain base flows necessary to provide for fish and wildlife preservation; (4) all reasonable and presently available methods of treatment shall be used prior to waste water entry; (5) multiple-purpose impoundment structures are to be preferred over single purpose structures; and (6) water management programs are deemed to be in the public interest. Furthermore, a water resources archive shall be established and maintained by the department of ecology to organize, collect and develop data and studies pertaining to water and related resources. (Frank-Florida)
W77-01002

HARBORS, TIDE WATERS AND WATER RIGHTS.
Wash Const art 15 secs 1 thru 2, art 17 secs 1 thru 2, art 21 sec 1.

Descriptors: *Washington, *Constitutional law, *Water rights, *Public rights, *Navigable waters, Water users, Docks, Water law, Tidal waters, Swamps, High water mark, Irrigation, Mining, State governments, Legal aspects, Harbors.

Article XV of the Washington constitution makes the following references to water law and water rights: (1) the legislature shall provide for the appointment of a commission which shall establish harbor lines in all state navigable waters, beyond which no rights shall be granted whatsoever; (2) no contract for the leasing of wharves or docks shall be made for any term longer than 30 years; (3) the state owns all beds and shores of navigable waters up to and including the ordinary high tide line; (4) the state disclaims all rights to tide, swamp and overflowed lands patented by the United States; and (5) the constitution defines the use of water for irrigation, mining and manufacturing as public uses. (Frank-Florida)
W77-01003

SHORELAND BOUNDARIES.
Wash Rev Code Ann secs 79.16.380, .419 thru .430, and .510 (1962).

Descriptors: *Legislation, *Washington, *Navigable waters, *Boundaries(Property), *Beds under water, Excavation, Locks, Gates, Shores, Construction, Canal construction, Dredging, Water utilization, Beds, Legal aspects, State governments.
Identifiers: *Fill permits.

The state of Washington has enacted legislation providing that when land is sold by the state that is adjacent to navigable waters, and the boundary is not defined, the water boundary shall be the line of ordinary navigation in such water. Where the water level is lowered either by state or federal action, the new water boundary shall be the line of ordinary navigation found in such waters after the lowering. This statute also reserves for public use all shorelands and the bed of Lake Washington, and it states specific boundaries. Where excavation of waterways is concerned, the commissioner of public lands may enter into contract with any person or company for the filling in and raising of shore lands. The governor must approve any such contract, and the restrictions on what lands shall be affected by this statute are listed. All waterways so excavated shall be public waterways, free to all citizens, with the exception of necessary tide gates or lock, the operation of which may be paid for by toll. (Frank-Florida)
W77-01004

TIDELANDS ACT; POWERS AND REGULATIONS.
Wash Rev Code Ann secs 76.16.140 thru .190 (1962).

Descriptors: *Legislation, *Washington, *Tidal waters, *Public access, *Public rights, Shellfish, Shellfish farming, Mining, Mineral industry, Oil, Oil wells, Oil industry, Access routes, Harbors, Rent, Leases, State governments, Federal government, Boundaries(Surfaces), Beds under water, Banks.
Identifiers: Water rights(Non-riparians).

The state of Washington has enacted legislation providing that certain offshore areas shall never be sold or leased for any purpose other than the extraction of petroleum, gas, or minerals. Any present leases existing for other purposes shall not be extended upon their expiration. The protected areas are listed. Certain tidelands are protected from sale or lease and reserved as public areas for recreational use and for the taking of fish and shellfish for personal use. These areas are listed and described. Where there is no access to these tidelands, the director of fisheries may take action to provide public and private access, including the building of roads and docks to and from the tidelands so described. Where harbor areas and tidelands are being rented in any manner, this statute is applicable for the determination of rental shares between the county and state governments. And where the federal government has established pierhead lines in any state waterway at any distance from the boundaries established by the state, no structure shall be allowed in the strip of waterway between the boundary and the nearest pierhead line except by the consent of the state. Technical waterway boundaries are presented. (Frank-Florida)
W77-01005

DRAINAGE DISTRICTS; POWERS.
Wash Rev Code Ann secs 85.06.010 and .070 (1962).

Descriptors: *Washington, *Legal aspects, *Legislation, *Drainage districts, *Eminent domain, Drainage programs, Drainage systems, State governments, Levee districts, Drainage area, Ditches, Drains, Condemnation, Construction, Dams, Outlets, Outlet works, Drainage.

The state of Washington has enacted legislation providing that drainage districts in the state shall have the power to sue and be sued and to condemn and appropriate private property for the construction and maintenance of systems of drainage. The power to condemn by eminent domain may be exercised within or without the drainage district boundaries. Such power must be exercised as to the property of both private corporations and private individuals. (Frank-Florida)
W77-01006

FLOOD CONTROL BY STATE IN COOPERATION WITH FEDERAL AGENCIES.
Wash Rev Code Ann secs 86.24.010 thru .050 (1962).

Descriptors: *Washington, *Legal aspects, *Flood control, *Administration, *Governmental interrelations, Short-term planning, Water control, Flow control, State governments, Long-term planning, Planning, Federal government, Conservation, Control, Water management(Applied), Water policy, Projects, Project planning, Legislation.

The State of Washington has authorized the state director of conservation to act for the state in the formulation of plans for flood control in the several flood-prone areas of the state. He shall also consider the extent to which the state should participate with the federal government or any other flood control district in the survey, planning or construction of flood control projects. State participation in flood control projects is limited by applicable funding provisions. This legislation enables the director to move outside his immediate agency to provide flood control measures and facilities in conjunction with other governmental units. (Frank-Florida)
W77-01007

DIKING DISTRICTS; POWERS.
Wash Rev Code Ann secs 85.05.010 and .070 (1962).

Descriptors: *Washington, *Legal aspects, *Dikes, *Construction, *Eminent domain, Canals, Ditches, Flumes, State governments, Locks, Beds, Rivers, Streams, Watercourses(Legal aspects), Planning, Compensation, State governments.
Identifiers: *Diking districts.

The Washington legislature has passed enabling legislation for the formation of diking districts. Each district shall have the following powers: (1) to condemn and appropriate private property by eminent domain for the construction and maintenance of a system of dikes; (2) to straighten, widen, deepen and improve any rivers or streams flowing through or located within the boundaries of such diking district, or where such bodies shall ever overflow and damage the land within such diking district; (3) to construct all needed dikes, drains, ditches, canals, flumes, and locks; (4) to change the bed or course of any river; and (5) to contract with any other diking disitricts for the construction or planning of all works or improvements. (Frank-Florida)
W77-01008

NAVIGABLE WATERS PROTECTION LAW.
Wis Stat Ann sec 144.26 (1974).

Descriptors: *Wisconsin, *State governments, *Legislation, *Shore protection, *Water resources development, Planning, Short-term planning, Long-term planning, Public rights, Public benefits, Data collections, Data storage and retrieval, Data transmission, Coordination, Local governments.

Wisconsin has enacted legislation declaring that it is in the public interest to make studies, establish policies, and authorize municipal shoreland regulations for the use, conservation, development and protection of the state's water resources. Therefore, the Department of Water Resources is directed to exercise the following powers: to make recommendations to existing state agencies concerning water resource activities; to locate and maintain all pertinent information; to serve as a clearinghouse for the guidance of the public in the solution of their problems; to prepare a comprehensive plan for the application of municipal ordinances regulating navigable waters and their shorelands; to prepare criteria for water protection studies and planning; and to coordinate all possible governing bodies to the benefit of the state water resources program. (Frank-Florida)
W77-01009

UTAH LAKE DIKING PROJECT.
Utah Code Ann secs 73-12-1 thru -4 (1958).

Descriptors: *Water resources development, *Utah, *Irrigation, *Dikes, *Reservoir construction, Construction, Irrigation systems, Water resources, Water storage, Preservation, *Water users, Projects, Benefits, Beneficial use, Project benefits, Project purposes, Water utilization, United States.
Identifiers: *Utah Lake(Utah), Water users associations.

Utah has enacted legislation authorizing the state's governor to convey lands in the bed of or on the margin of Utah Lake to the United States of America for the purpose of assisting the federal government in developing water resources in the state. However, the governor shall not make any such conveyance until an agreement has been made between the United States and a water users' association for the construction of any storage reservoir, dike, or other works necessary for irrigation. Other provisions concern the manner of executing and attesting various deeds and an exact description of the lands subject to this act. (Lauer-Florida)
W77-01010

WATER CONSERVANCY ACT.
Utah Code Ann secs 73-9-1 thru 73-9-4, 73-9-12 thru 73-9-14 (1958), as amended, (Supp 1975).

Descriptors: *Utah, *Resources development, *Water conservation, *Land conservation, *Administrative agencies, Environmental control, Beneficial use, Water allocation(Policy), Regulation, Legislation, Water resources development, Public health, Local governments, Water management(Applied).
Identifiers: *Water Conservancy Act(Utah).

The Utah legislation has created Water Conservancy Districts to provide for conservation and development of state water and land resources, and to benefit the public, industries, municipalities, and lands under irrigation. Specific provisions concern: (1) requirements for establishing a district; (2) the courts which have jurisdiction to establish a district; (3) powers of the board and duties of the secretary of each district; and (4) the requirements for establishing sub-districts and their powers. Also set forth are the powers and duties of district boards in promoting water development within their respective districts. (Lauer-Florida)
W77-01011

APPROPRIATION.
Utah Code Ann secs 73-3-1, 73-3-19 thru -23 (1968).

Descriptors: *Utah, *Appropriation, *Water allocation(Policy), *Beneficial use, *Priorities, Legal aspects, Water utilization, Water rights, Water quality, Regulation, Water quality control, Jurisdiction, Damages, Distribution, Diversion, Diversion losses, Impounded waters, Prior appropriation.
Identifiers: Public waters, Right of entry.

Rights to the use of unappropriated public waters in Utah may be acquired by applying to the state engineer. The appropriation must be for some useful and beneficial purpose. Furthermore, whenever an applicant must enter private property to survey or secure information for making a water filing and is refused right of entry, he may petition the district court for an order granting such right. An applicant may also divert appropriated waters into natural streams and impound them after acquiring the approval of the state engineer. Specific regulations concern the quantity, quality and expenses involved in such appropriation. Appropriators shall have priority among themselves according to the dates of their respective appropriations. Other provisions govern the replacement of underground water by any junior appropriator whose appropriation may diminish the quantity or injuriously affect the quality of appropriated underground water in which the right to the use thereof has been established by law. (Lauer-Florida)
W77-01012

NAVIGATION LAW, SECTION 89-B.
1973 Op Att'y Gen New York 18-22. 5 p.

Descriptors: *New York, *Navigable waters, *State jurisdiction, *Judicial decisions, Ships, Political aspects, Regulation, Legal aspects, Riparian rights, Navigation, Bodies of water, Law of the sea, Water policy, Water rights, Federal jurisdiction, Reservation doctrine, Control, Legislation, Operations, Permits, Coasts.
Identifiers: *Licenses, Administrative regulations, Coastal waters, Coastal zone management.

The New York Navigation Law provides that foreign flag vessels and American vessels under registry, that is, engaged in foreign trade, which transit state territorial waters are subject to state pilotage laws. Such laws are not applicable to American vessels engaged in the domestic coasting trade. Decisions of the U.S. Supreme Court are discussed which hold that one having a federal pilot's license is not thereby qualified to navigate a foreign flag vessel or an American vessel under registry in state waters regulated by state pilotage laws. (Reinders-Florida)
W77-01013

UNAPPROPRIATED WATER IN UNDERGROUND WATER BASIN.
1973 Rep of New Mex Att'y Gen 38-9. 2 p.

Descriptors: *New Mexico, *Water conservation, *Water management(Applied), *Water allocation(Policy), Water distribution(Policy), Competing uses, Equitable apportionment, Water demand, Water utilization, Control, Regulation, Water rights, Reservoir operation, Water resources, Well permits, Water policy, Permits, Subsurface waters, Groundwater availability, Groundwater basins.
Identifiers: Water rights(Non-riparians), Administrative regulations, Licenses.

In an underground basin or reservoir with reasonably ascertainable boundaries, the State Engineer may not authorize a new water use appropriation unless unappropriated water exists or the proposed appropriation involves a non-consumptive use which will not impair existing rights. Under present law the State Engineer must determine whether unappropriated water exists on a case by case basis. The burden is upon the applicant to demonstrate that unappropriated water exists or that no impairment of existing rights will be caused. Even though no unappropriated water exists, an application for a new appropriation must nevertheless be approved provided it involves a non-consumptive use of water; that is, one that causes no net depletion of water in a reservoir and therefore does not impair existing rights. (Reinders-Florida)
W77-01014

MARINE RESOURCES COMMISSION--OYSTER GROUNDS--USE OF SUBAQUEOUS LANDS FOR CONSTRUCTION AND MAINTENANCE OF SEWAGE DISPOSAL FACILITIES.
1973-1974 Op Att'y Gen Va 236-37. 2 p.

Descriptors: *Virginia, *Sewage systems, *Oysters, *Shellfish farming, *Public lands, Public rights, Constitutional law, Sewage districts, Governments, Legal aspects, Sanitary engineering, Sewage disposal, Water law, Public utilities, Public works, Construction, Shallow water, Water types, Beds under water.
Identifiers: Water rights(Non-riparians), Public trust doctrine, Subaqueous lands, Oyster beds.

The Virginia Constitution provides that natural oyster beds in commonwealth waters are to be held in trust for the people of the state. This section does not prohibit the legislature from authorizing the use of tidal waters for any public purpose. Subaqueous lands may be used for the construction and maintenance of sewage disposal facilities. Broad authorization was given to the Hampton Roads Sanitation District Commission for the use of any state subaqueous lands. This authorization is construed to encompass lands held under private leases from the state, subject to the compensation requirement of the Fifth Amendment. (Reinders-Florida)
W77-01015

O'BRIEN V BARNES BUILDING COMPANY (DEFINITION OF TIDAL WETLANDS).
380 NYS2d 405-29 (Sup Ct 1974). 25 p.

Descriptors: *New York, *Wetlands, *Tidal waters, *Jurisdiction, *Judicial decisions, State governments, Delaware, Rhode Island, Maryland, Construction, Tides, Salinity, Administrative decisions, Storm surge, Legal aspects, Coasts.
Identifiers: *Coastal zone management, *Coastal waters, *Coastal Zone Management Act.

Plaintiff individuals and conservation group brought an action seeking an injunction to prevent defendant developers from constructing a housing development since an adjacent pond and the land surrounding it were protected tidal wetlands under

the Tidal Wetlands Act. At the heart of the suit was the interpretation of the New York statutory phrase 'areas now or formerly connected to tidal waters'. Although the phrase had not received judicial interpretation by New York courts, the plaintiffs maintained that there was no implied time limitation on the word 'formerly'. In support of their contention, the plaintiffs cited Delaware statute that defined wetlands as including areas which now or in this century have been connected to tidal waters. The court noted that the Delaware definition was in the minority, and looked to other criteria to determine the status of the water body. Under the Rhode Island and Maine statutes, which were found to represent the majority view, wetland use and susceptibility to storm flowage respectively are determinative of wetlands status. Under these statutes, the pond and the adjacent land did not qualify as wetlands. The court also noted that the pond would not be granted wetland status under the federal Coastal Zone Management Act, which uses salinity as the sole criterion in determining areas within its jurisdiction. Thus, the court found for the defendants and removed the restraining order although it did not bar a later action for an injunction on the grounds of possible environmental damage. (Frank-Florida)
W77-01016

IDAHO WATER RESOURCE BOARD V KRAMER (STATUTORY INTERPRETATION OF WATER RESOURCES BOARD COMPREHENSIVE STATE WATER PLANNING).
548 P2d 35-72 (Idaho 1976). 38 p.

Descriptors: *Idaho, *State governments, *Judicial decisions, *Water resources development, Permits, Constitutional law, Water use, Dams, Dam construction, Water supply, Water supply development, Construction, Legal aspects.

Appellant Secretary of the Idaho Water Resource Board sought dismissal of a writ of mandamus forcing him to approve an application made by respondent Board to the Federal Power Commission for a power licence. In upholding the issuance of the writ, the Idaho Supreme Court made the following findings of fact: (1) where hearings were required by the Water Resources Board in 'affected areas', that meant only those areas subject to the most immediate and direct impact of any project proposal; (2) an overall water resource plan need not be adopted in one complete act, but rather may be done in stages; (3) development and conversation of water resources is a public purpose within the meaning of the state's due process clause; and (4) this proposed joint undertaking between the Board and a private power company involved dam construction, and was not arbitrary or unreasonable. The court further ruled that the very essence of the project was to maximize the use of water, and thus, upheld the mandate over the numerous substantive and procedural objections made by the Secretary. (Frank-Florida)
W77-01017

WATERS--FISH AND GAME--DEPOSIT OF PESTICIDES IN PUBLIC WATERS.
1973 Op Att'y Gen Wisconsin 130-32. 3 p.

Descriptors: *Wisconsin, *Pesticides, *Fishkill, *Water law, *Penalties(Legal), Water pollution effects, Legislation, Pollutants, Toxins, Water pollution, Control, Constitutional law, State jurisdiction, Negligence, Legal aspects, Water pollution sources, Pesticide toxicity, Hazards, Water quality control, Chemical wastes.
Identifiers: Administrative regulations.

Wisconsin state law authorizes the Department of Agriculture to adopt rules governing the use and formulation of pesticides, and to determine the time and means of their application. The Attorney General of Wisconsin has determined that prosecution for violation of such rules is not barred by a civil action brought to recover statutory damages for the killing of fish allowed under a separate statute. Prosecution under both sections is permissible since different elements must be proven in each case. Prosecution for violation of more than one statute, arising from a single occurrance or chain of events, is not unusual and enjoys statutory sanction in Wisconsin. (Reinders-Florida)
W77-01042

RESERVE MINING CO V CITY OF DULUTH (FILTRATION OF LAKE SUPERIOR BY CORPS OF ENGINEERS).
529 F2d 181-89 (8th Cir 1976). 9 p.

Descriptors: *Potable water, *Filtration, *Domestic water, *Industrial wastes, *Lake Superior, Jurisdiction, Federal government, Mining, Legal review, Judicial decisions, Administrative agencies, Public health, costs, Water pollution, Mineral industry, Cities, Municipal water, Water purification, Mine wastes, Water quality, Treatment, Great Lakes, Lakes, *Minnesota.
Identifiers: Carcinogens, Taconite.

Appellant mining company sought relief from a district court order requiring the appellant to pay $100,000 to appellee city to provide for filtration of the city's water supply. The Eight Circuit Court of Appeals dissolved the order because of a lack of procedural due process and remanded the case to the district court for a proper determination of the costs of filtration to be charged to the appellant. The Corps of Engineers, under a district court order to provide filtered drinking water to the communities on Lake Superior because of the imminent health hazard caused by appellant's discharge of taconite tailings, sought to shift this responsibility to local officials. The Court of Appeals recognized a responsibility for local governmental cooperation but said continued federal supervision was required because of the following factors: (1) federal jurisdiction over Lake Superior; (2) pollution affecting several states; (3) legal action initiated by the federal government; (4) technical knowledge possessed by federal agencies; and (5) lack of expertise by local governments. (Capehart-Florida)
W77-01043

CIRCLE INVESTMENT CO V CITY OF TOLEDO (EFFECT OF CHANGING CANAL TO LIMITED ACCESS HIGHWAY ON ABUTTING LANDOWNERS--NO ACCESS REQUIRED).
345 NE2d 442-48 (Ohio Ct App 1975). 7 p.

Descriptors: *Ohio, *Highways, *Canals, *Public access, *Access routes, Boundaries(Property), Land tenure, Real property, State governments, Cities, Right-of-way, Judicial decisions, Canal embankments, Banks, Beds, Legal aspects, Roads, Transportation, Inland waterways, Lake Erie.

Plaintiff investment company brought suit against defendant city for a declaratory judgment proclaiming the existance of a right of way from a limited access highway to a tract of land owned by the plaintiff. The plaintiff's property was bounded on three sides by a turnpike and two railroad lines. The only physical access available was from the limited access highway on the fourth side. The limited access highway was located on land formerly occupied by the bed, banks, and towpath of a canal. The city had acquired fee simple title to the canal property by purchase from the state. The plaintiff contended that he had a right of access to the highway by virtue of a right of access to the canal. The trial court found for the defendant city and the Court of Appeals of Ohio affirmed, holding that the right of access of ownership of land abutting the canal was no greater than the public right of access; furthermore, that the change of use from a canal to a highway did not create new rights in abutting owners. The court also held that abandonment of the canal by the state did not cause the title to revert to the grantor since the interest was in fee simple. (Capehart-Florida)
W77-01044

LOUISIANA ENVIRONMENTAL SOCIETY V BRINEGAR (ENVIRONMENTAL IMPACT STATEMENT AS TO ARTIFICIAL LAKE TO BE BRIDGED BY HIGHWAY CONSTRUCTION).
407 F Supp 1309-26 (WD La 1976). 18 p.

Descriptors: *Artificial lakes, *Louisiana, *Highway relocation, *Public rights, *Bridges, Engineering structures, Water policy, Water law, Bridge construction, Judicial decisions, Legal aspects, State governments, Construction, Planning, Road construction, Economics, Environmental effects, Civil engineering, Highways, Highway effects.
Identifiers: Injunctive relief, Environmental impact statements.

Plaintiff environmental society requested an injunction to halt bridging of an artificial lake for construction of an interstate highway bypass. The U.S. District Court held that the Secretary of Transportation acted within his authority in determining that, although alternate routes were feasible, only the adopted route was prudent. The Secretary could reasonably have believed that unusual factors were present or that alternatives involved problems of extraordinary magnitude. A subsequent amendment requiring public hearings on social and environmental effects would not be required since environmental aspects had been considered in depth. Furthermore, a new drainage system incorporated into the bridge did not require a new hearing. (Reinders-Florida)
W77-01045

IT'S TIME TO STOP KILLING THE OCEAN,
National Wildlife Federation, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-01046

IRRIGATION WITHOUT WASTES,
For primary bibliographic entry see Field 3F.
W77-01047

MID-SHIAWASSEE COUNTY CONCERNED CITIZENS V TRAIN (ENVIRONMENTAL IMPACT AS TO A PHYSICAL-CHEMICAL MODE OF TREATMENT FOR A WASTE-WATER TREATMENT PLANT).
408 F Supp 650-60 (ED Mich, SD 1976). 11 p.

Descriptors: *Michigan, *Judicial decisions, *Decision making, *Waste water treatment, *Administrative decisions, Water policy, Grants, Projects, Water rights, Adjudication procedure, Sanitary engineering, Legislation, Intergovernmental relations, Administration, Sewage treatment, Waste water disposal, Water law, Planning, Permits, Control, Legal aspects.
Identifiers: *Environmental Impact Statements, *National Environmental Policy Act, Administrative regulations, Comparative law.

A citizen's group brought suit to compel state officials to comply with the National Environmental Policy Act. The officials had approved federal and state grant assistance for construction of a physical-chemical wastewater treatment facility within the city of Owosso, Michigan. The court granted the defendants' motion to dismiss the complaint, holding that where a federal agency concludes an environmental impact statement is not necessary, that agency must issue a negative declaration supported by a 'mini' EIS or an environmental impact appraisal. The determination that an EIS is not necessary is subject only to an arbitrary or capricious standard of review. Thus a court will not rule on the relative merits of competng scientific opinion where the sufficiency of an EIS statement is an issue. (Reinders-Florida)
W77-01048

ARK-MO FARMS, INC. V. UNITED STATES (PROBLEM OF PROOF IN RECOVERING FOR FLOOD DAMAGE TO CROPS).
For primary bibliographic entry see Field 3F.
W77-01050

6F. Nonstructural Alternatives

WATER ZONING - TOOL FOR GROUNDWATER BASIN MANAGERS,
Geological Survey, Denver, Colo.
L. C. Dutcher, and L. R. Peterson.
Ground Water, Vol. 13, No. 5, p 395-399, September-October 1975. 5 ref.

Descriptors: *Groundwater, *Groundwater availability, *Groundwater basins, *Groundwater resources, *Water zoning, Water conservation.

Water zoning is not new in arid areas. Many States have laws limiting pumping. However, most of the existing ordinances do not achieve their stated purpose. Many enforce conservation of scarce resources for benefit of future users. Some purport to ensure a continuous water supply to the rights holders. Existing ordinances that limit pumping to the so-called safe yield do not take costs or recoverable benefits into consideration, and the period of use is not stipulated. Therefore, where pumping is regulated under such ordinances, the basins cannot be managed to obtain maximum benefits to present users of the available supply. Two types of ordinances are discussed: general-purpose and management-plan ordinances, which are designed to make possible the achievement of specific objectives. Examples are given of how the latter can be designed to: limit stream depletion and protect existing rights; disperse pumping to increase economic return; force conjunctive use of all land, mineral, and water resources; and establish production quotas to insure optimum economic return to all users during a predetermined period. (Skogerboe-Colo St)
W77-00552

URBAN FLOOD WARNING AND WATERSHED MANAGEMENT ADVANCES IN METROPOLITAN MELBOURNE,
Melbourne and Metropolitan Board of Works. (Australia).
C. T. Earl, D. C. Thompson, J. W. Porter, J. A. Lanaway, and A. S. Alexander.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 549, Price codes: A05 in paper copy, A01 in microfiche.
American Society of Civil Engineers, New York, N. Y., Urban Water Resources Research Program, Technical Memorandum No. 30, June, 1976. 72 p., 3 tab., 3 fig., 15 ref. OWRT C-5045(No. 4224)(6).

Descriptors: *Urbanization, *Administrative agencies, *Warning systems, *Flood protection, *Flood plains, *Comprehensive planning, Local governments, Detention reservoirs, Forecasting, Water quality control, Flood plain zoning, Monitoring, Telemetry, Sediment control, Computer models, Cost analysis, *Australia, *Urban drainage, Combined sewers.
Identifiers: *Melbourne(Australia), *Dandenong Valley(Asustralia), Integrated management, Storm sewer discharges, Combined sewer overflows.

Advances made in institutional arrangements and flood warning systems are reported. Outlned in Part I are functions of the Melbourne and Metropolitan Board of Works, flood problems it encounters, and its mitigative procedures, including non-structural measures. Part II describes a computer-operated and telemetered rainfall and flow gage-network for flood forecasting and prediction recently installed in metropolitan Melbourne. Part III describes the Dandenong Valley Authority, a unique organization having responsibilities for planning, flood protection, drainage, pollution abatement and aesthetic/recreational aspects in its 286-sq. mi. jurisdiction. A number of ideas utilized and lessons learned are relevant in the U.S.(Mc Pherson-ASCE)
W77-00670

THE PARTICIPATION OF NEW YORK COMMUNITIES IN THE FEDERAL FLOOD INSURANCE PROGRAM,
Cornell Univ. Agricultural Experiment Station, Ithaca, N.Y. Dept. of Rural Sociology.
D. E. Moore, and R. L. Cantrell.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 550, Price codes: A02 in paper copy, A01 in microfiche.
Cornell Community and Resource Development Series, Bulletin 11, March 1976. 25 p., 1 fig., 7 tab., 20 ref. OWRT A-057-NY(1), 14-31-0001-5032.

Descriptors: *Flood insurance, *Land use, *Community development, Zoning, Building codes, *National Flood Insurance Act, Decision making, *New York, *Social participation.
Identifiers: Flood hazards, Community structure, *Community participation.

The Federal Flood Insurance Program requires that individual communities pass a land use law aimed at reducing flood losses before individuals in their respective communities can purchase flood insurance. Some communities with flood hazard areas have responded with varying rates of speed, while others have not responded at all. By July 1, 1975, more than one-third of the 745 New York communities threatened with federal sanctions had failed to act. This research develops a model to predict whether or not communities will adopt the program and their speed of adoption. The theoretical concepts employed are community differentiation, community centrality, and program need. These variables are operationalized using the presence or absence of a zoning ordinance, whether or not the community subscribes to the New York State Building Code, recent experience with flooding, and regional location in New York State. Each of these variables is positively and independently related to program adoption, speed of adoption, and whether the community initiates the action to participate or acts in response to federal notification. The findings are consistent with other studies of community innovation and change. Policy implications of the findings are discussed.
W77-00671

A REGIONAL PLANNING APPROACH TO THE FLOODPLAIN MANAGEMENT PROBLEM,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
R. N. Weisz, and J. C. Day.
Annals of Regional Science, Vol. IX, No. 3, p. 80-92, 1975.

Descriptors: *Flood protection, *Watershed management, *Integrated control measures, *Comprehensive planning, *Mathematical models, *Economic efficiency, Land use, Engineering structures, Optimization, Flood plain zoning, Building codes, Flood control, Economic rent, Arizona, Linear programming.
Identifiers: *Floodplain Management System, Pima County(Ariz).

The Floodplain Management System model (FMS) establishes a framework whereby land use and engineering methods can be combined and evaluated on a common basis to arrive at the most economically efficient flood protection solution. The model also permits identification of desirable combinations of land use and engineering works. It was tested in application to Pima County, Arizona, by considering the following alternatives: (1) Land use regulations (spatial and temporal distribution of urban land uses, site elevation through dirt fill, and floodproofing); (2) development policies (public acquisition of undeveloped land for open space, and public acquisition and removal of existing improvements from the floodplain); (3) engineering measures (dams, channel improvements). The plan formulation method is simple and straight-forward. For each possible development policy-engineering measure(s), the influence of public investment on the object row coefficients of all linear programmed land use activities is determined; the potential land use activities are screened so that only those containing economically efficient combinations of fill and floodproofing enter the LP model; the amount of land resource that is available in each location for LP land use assignments is computed; other appropriate constraints are determined, and the LP model is run. Economic rent is used to quantify the impact of each FMS mixture of means for attaining management objectives. (Auen-Wisconsin)
W77-00704

A TALE OF TWO CITIES: FLOOD HISTORY AND THE PROPHETIC PAST OF RAPID CITY,
Waikato Univ., Hamilton (New Zealand).
N. J. Ericksen.
Economic Geography, Vol. 51, No. 4, p. 305-320, 1975. 3 fig., 1 tab., 42 ref. NSF GI-32942.

Descriptors: *Flood protection, *Flood control, *Integrated control measures, *Decision making, Flood pin zoning, Future planning(Projected), Flood damage, Attitudes, *South Dakota.
Identifiers: *Rapid City(SD), Scenario analysis.

To demonstrate how new flood policies may ameliorate damage, the history of flood plain management in Rapid City is given starting from the response to its flood problem and ending with the disastrous flood of June 9, 1972. A scenario then posits what could have happened had various methods for reducing flood losses been adopted. Although the focus is on the impediments to the development of a sound flood plain management for that city it is applicable to the problems that face flood-prone communities in the over-reliance upon single engineering solutions; the lack of an integrated, multi-adjustment approach; the unawareness of constraints on the adoption of various adjustments; the inadequacy of traditional methods for evaluating adjustments; and the relevance of scenario analysis for the community decision-maker. The schism between what happened and what could have happened and what could have happened underscores the necessity for an approach that incorporates a broad range of adjustments into an integrated whole. The project evaluations conducted by federal agencies in Rapid City are at such variance with the actual outcome that the assumptions used in the various benefit-cost analyses, if not the mode of analysis itself, are questionable. A series of post-audit evaluations should be considered in selected flood-prone cities to thoroughly review the methodological procedures which denied Rapid City an adequate flood plain management program. (Auen-Wisconsin)
W77-00706

PLANNING FOR STORM WATER MANAGEMENT,
Watkins (G. Reynolds) Consulting Engineers, Inc., Lexington, Ky.
W. H. Qualls.
Public Works, Vol. 10, No. 1, p 43-47, January 1976. 2 fig, 1 tab.

Descriptors: *Kentucky, *Storm runoff, *Nonstructural alternatives, *Storm water, *Drainage basins, *Flood plain insurance, *Flood plains, *Flood plain zoning, *Detention reservoirs, *Flood control, Flood discharge, Flood protection, Floods, Flooding, Storms.
Identifiers: *Storm Water Management Plan, Wilmore(KY).

The Storm Water Management Plan is a 3 part program addressing the multiple needs of storm water

protection within a short and long-range context in the town of Wilmore, KY. The old solution was to build more storm sewers which would only push the problem downstream. It did not provide financial relief for those whose property was damaged nor maximum protection with the least expenditure. The first program of the management plan is a storm water facilities plan to propose physical improvements minimizing flood damage to existing areas and to insure that future development does not create similar flood problems. Drainage detention basins ranging from 116 to 216 acres were suggested. Land use, population projections and storm water runoff were studied to provide for future needs. Alternative plan 'A' was selected which would clean existing drainage channels; install 4 detention basins; improve certain headwells and culvert entrances, install inlet bar grates and replace drop inlets with standard inlets; construct curbs, gutters and underground sewers where detention basins are not feasible. The second part of the plan is a flood plain zoning ordinance to prevent new or reconstructed buildings from improperly encroaching on flood plains where the building might be damaged or might contribute to the intensity of downstream flooding. The third element of the management plan is federally subsidized flood plain insurance to insure existing buildings and property. (Gentry-North Carolina)
W77-00770

FLOOD PLAIN MANAGEMENT ALTERNATIVES IN THE MAITLAND AREA (AUSTRALIA),
New South Wales Univ., Kensington (Australia).
For primary bibliographic entry see Field 4A.
W77-00932

DEVELOPMENT OF FLOOD PLAIN MANAGEMENT FOR FORT COLLINS, COLORADO - A CASE STUDY OF U.S. PRACTICE,
New South Wales Univ., Kensington (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W77-00933

FLOOD MITIGATION STRATEGIES: THE ROLE OF INSURANCE AND STRUCTURAL MEASURES,
New South Wales Dept. of Agriculture, Sydney (Australia).
G. A. Forsythe.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 10 - 14, June 1976. 3 ref.

Descriptors: *Flood mitigation, *Flood plain insurance, *Cost-benefit analysis, *Flood control, Non-structural alternatives, Flood protection, *Australia.

Recent occurrences of flooding in Australia have highlighted the inadequacy of existing flood mitigation policy, which relies heavily on structural measures. These measures, and insurance as a non-structural alternative, are analysed in terms of a multidimensional social welfare function. A third alternative strategy, with insurance as a base, and utilizing structural measures where feasible, is shown to effectively maximize the beneficial features of both measures. Problems relating to the workability of such a scheme are outlined. (CSIRO)
W77-00934

FLOOD STANDARDS - THE ROLE OF ENGINEERING INSTITUTIONS,
Binnie and Partners, Melbourne (Australia).
F. M. Law.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers, Australia, Preprints of Papers, p. 15 - 19, June 1976. 2 tab, 26 ref.

Descriptors: *Design standards, *Institutions, *Dam design, *Flood protection, Design criteria, Design flood, Dam failure, Project planning, Safety factors, *Australia, United States.

Subjective factors influencing the setting of flood standards are examined, with particular reference to dam safety. Recent work in Britain and Australia is compared with that in America. Standards for protecting agricultural land which may be desired by a financing authority are discussed in relation to a British example. It is concluded that professional engineering institutions offer the best means of reconciling conflicts of safety and economy in so far as these are governed by arbitrary standards. (CSIRO)
W77-00935

OPTIMIZING BENEFITS TO URBAN RESIDENTS OF A TOTAL FLOOD WARNING SYSTEM FOR THE BRISBANE VALLEY (AUSTRALIA),
Bureau of Meteorology, Brisbane (Australia). Hydrometeorology Section.
For primary bibliographic entry see Field 4A.
W77-00944

HYDROLOGY OF FLOOD MITIGATION MEASURES IN THE PAHANG RIVER BASIN, MALAYSIA - A CASE STUDY,
For primary bibliographic entry see Field 4A.
W77-00946

THE NATION'S INCREASING VULNERABILITY TO FLOOD CATASTROPHE,
J. E. Goddard.
Journal of Soil and Water Conservation, Vol 31, No 2, p 48-52, March-April 1976. 5 p 1 photo, 3 tab, 3 chart.

Descriptors: *Flood damage, *Flood plains, *Flood plain insurance, *Flood plain zoning, *Floods, Flood discharge, Flood protection, Flood recurrence interval, Floodgates, Warning systems, Diversion structures, Diversion dams, Civil engineering, Dams, Dikes, Drainage systems, State governments.

Since 1936 the federal government's response to floodplain management has generally been limited to the construction of flood control structures such as levees, walls, and detention reservoirs. These structures are designed to safeguard only against moderate floods, and thus have been ineffective against major floods. A more widespread solution should be implemented. Flood insurance, which is now almost mandatory for floodplain structures, should have universal application in flood prone areas. A major improvement should come with the advent of floodplain planning and floodplain regulations. These involve application of the police power by a locality to guide and control land use and development in flood-hazard areas. Zoning, subdivision regulations, building codes and health regulations will be the specific tools used. Furthermore, open areas are needed to provide for the passage of floodwaters. This, when combined with floodproofing, will assure minimal damage from floodwaters. (Frank-Florida)
W77-00961

FLOODPLAIN MANAGEMENT: THE IOWA EXPERIENCE,
Iowa State Water Resources Research Inst., Ames.
M. D. Dougal.
Journal of Soil and Water Conservation, Vol 31, No 2, p 60-2, March-April 1976. 3 p, 1 photo, 5 ref.

Descriptors: *Iowa, *Legislation, *Flood protection, *Flood plain insurance, *Flood plain zoning, Civil engineering, Dikes, Drainage systems, Diversion dams, Floodgates, Warning systems, Federal government, State governments, Floods, Flood discharge, Zoning.

Iowa has been among the nation's leaders in taking floodplain management steps. Urged on by devastating floods in 1944 and 1947, the legislature created the Iowa Natural Resources Council in 1949. The Council had the following goals: protection of life and property from floods; prevention of damage to lands; implementation of an orderly and systematic land use plan. In connection with the development, Iowa City enacted the first successful floodplain zoning ordinance in 1962 after obtaining the support of the legal profession, local realtors, and land developers. Iowa's experience was watched closely by other cities; now, other such ordinances are being developed throughout the state. The enrollment rate in federal flood insurance plans has also increased greatly. Problems still to be overcome include increasing urbanization, and the need for a statewide study of stream straightening problems, and for greater construction of flood control engineering works. (Frank-Florida)
W77-00962

6G. Ecologic Impact Of Water Development

TECHNOLOGY ASSESSMENT FOR NEW WATER DEVELOPMENT PROJECTS, (VOLUME I),
Virodyne Corp., Littleton, Colo.
For primary bibliographic entry see Field 6B.
W77-00527

AGRICULTURAL AND ENVIRONMENTAL IMPACTS AS A RESULT OF INCREASED DEMANDS FOR ENERGY DEVELOPMENT,
For primary bibliographic entry see Field 6D.
W77-00545

POLLUTION ECOLOGY OF FRESHWATER INVERTEBRATES,
For primary bibliographic entry see Field 2I.
W77-00557

SPORT FISHERIES AND OFFSHORE OIL,
New York State Dept. of Environmental Conservation, Delmar. Div. of Marine and Coastal Resources.
A. C. Jensen.
N Y Fish Game J. 21(2), p 105-116, 1974.

Descriptors: Oil pollution, Sport fishing, Continental Shelf, Northeast US, New York, Environmental effects.

The possibility of exploratory and production drilling for petroleum on the Continental Shelf off the Northeast Coast of the USA has aroused the concern of sportfishermen from New York and neighboring states. The marine sportfishery resources in the area are discussed in relation to the suspected petroleum reserves.--Copyright 1975, Biological Abstracts, Inc.
W77-00680

HOUSING DEVELOPMENT CANALS IN THE COASTAL ZONE OF THE GULF OF MEXICO: ECOLOGICAL CONSEQUENCES, REGULATIONS, AND RECOMMENDATIONS,
National Marine Fisheries Service, St. Petersburg, Fla. Environmental Assessment Div.
W. N. Lindall, and L. Trent.
Marine Fisheries Review, Vol. 37, No. 10, p. 19-24, 1975. 3 fig, 18 ref.

Descriptors: *Canal construction, *Wetlands, *Tidal marshes, *Estuaries, *Real property, Legislation, Intertidal areas, High water mark, Building codes, *Environmental effects, Gulf of Mexico, Fisheries, Coastal plains.
Identifiers: Housing developments, Waterfront real estate, Bayfills.

The environmental effects of estuarine canal construction to provide waterfront housing and the regulatory requirements to avoid ecological harm are discussed. Real estate development canals in bayfills, inland, and intertidal developments threaten wetland vegetation, water quality, bottom habitats, and faunal changes with deleterious effects on fisheries. Because federal legislation (confirmed by court decisions) regulates dredging and filling below the high tide water mark developers have turned to excavating wetland areas above the mean high tide, with Corps of Engineers permits only required for construction of access canals to navigable waters. The reluctance of the Corps to regulate dredging and filling in wetlands was overcome by the court decision of March 27, 1975. Preliminary guidelines for the location and design of inland canals are proposed, including residential lot restrictions to high ground; access canals to follow the shortest route and avoid damage to intertidal marshes, submerged grass beds, and oyster reefs; turbidity and sediment dispersion controls; canals to be engineered as flow-through systems, supplemented by pumps; canal depth should be uniform and within the euphotic zone, or shallowing away from the parent body; and septic tanks and sewage effluents to be disallowed in the development. (Auen-Wisconsin)
W77-00701

PLANNING LEVEL AND PROGRAM IMPACT STATEMENTS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT: A DEFINITIONAL APPROACH,
California Univ., Los Angeles. School of Law.
J. W. Wegner.
UCLA Law Review, Vol. 23, No. 124, p. 124-163, 1975.

Descriptors: *Project planning, *Federal project policy, *Environmental effects, *Judicial decisions, Multi-purpose projects, Comprehensive planning.
Identifiers: *Environmental Impact Statements, National Environmental Policy Act.

The requirements of the National Environmental Policy Act for preparation of Environmental Impact Statements appear to be circumvented by the courts in overlooking the critical provisions of the Act, i.e., to institutionalize an environmentally aware approach to decision-making and to provide a record of such decision-making susceptible to challenge and review by the courts and the public. The EIS preparation mechanisms are now being probed through growing litigation bearing on time and scope of statements: at what state in the planning of a project must an agency declare itself by preparing an EIS, and if other projects are associated with the one at issue, must a comprehensive, multiple-project statement be prepared. Another problem to be adjudicated is whether an EIS must be prepared at that point in a continuing course of pre-implementation planning when it has become apparent that a 'major federal action' exists. A satisfactory resolution of the definition of timing and scope can be achieved in case law to meet the statutory EIS requirement formula is the concept of 'a major federal action.' It can include a pattern or series of acts that seem to be part of a single under-taking and which need not be completed before an 'action' is recognized; or 'action' can be said to exist when a series of activities reaches a stage of coherence and maturity which suggests that a decision to go forward is being made and has a reasonable possibility of being implemented. (Auen-Wisconsin)
W77-00705

THE ENVIRONMENTAL IMPACT OF A LARGE TROPICAL RESERVOIR: GUIDELINES FOR POLICY AND PLANNING. BASED UPON A CASE STUDY OF LAKE VOLTA, GHANA, IN 1973 AND 1974,
Smithsonian Institution, Washington, D. C.
P. H. Freeman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 430, Price codes: A05 in paper copy, A01 in microfiche. Prepared for the Agency for International Development, 1974. 97 p, 6 fig, 7 plates, 6 tab, 51 ref, append. AID/csd-2608.

Descriptors: *Planning, Social aspects, Economics, *Environmental effects, *Reservoirs, *Dams, *Planning, *Water resources development, Alternative planning, Lakes, Data, Social impact, Fish, Nutrients, Erosion, Irrigation, Africa.
Identifiers: *Lake Volta(Ghana), *Schistosomiasis *Volta River Authority, Malaria, *Ecological impacts.

By the year 2000, the portion of the world's streamflow regulated by reservoirs will increase from one-tenth to two-thirds. Many new reservoirs will be located in the tropics where reservoirs have been shown to create problems: ecological - water weeds, evaporation and/or sedimentation, obstruction of fish migration and perturbation of downstream hydrology and aquatic systems; health - impounded water as a growth medium for malaria and schistosmiasis; social and economic - resettling people from rich alluvial and flood plain farmlands. Using the Volta Lake case study and other published experience, a brief narrative of like ly impacts is given, followed by questions that should be asked to determine impacts. Guidelines are given for (1) environmental assessment of alternative impoundment sites - seismic and hydrological impacts, effect on natural rivers and forests, effects on archaelogical remains, effects on human settlements and farmland, impacts below damsite; (2) assessment of hydrological and biological impacts following dam closure; (3) assessment of environmental and ecological impacts of a tropical reservoir, including lake geology, groundwater geology, lake topography, mineral cycling, plankton, aquatic plants, fish nutrition and production, water supply and sewage, control of disease. Researchers found it was not possible to assess lake effects on groundwater movement. The main variable for the lake appears to be runoff. Problems of exposure to schistosmiasis and bacterial contamination complicate use of the lake as a water supply. Lake assimilative capacity for wastewaters is great and agricultural and industrial wastewaters are not current problems. (Gentry-North Carolina)
W77-00767

ALTERNATIVE FUTURES FOR ENVIRONMENTAL POLICY PLANNING: 1975 - 2000,
Stanford Research Inst., Menlo Park, Calif. Center for the Study of Social Policy.
For primary bibliographic entry see Field 5G.
W77-00768

ENVIRONMENTAL MANAGEMENT IN THE MALIBU WATERSHED: INSTITUTIONAL FRAMEWORK,
California Univ., Los Angeles. School of Architecture and Urban Planning.
W. D. Conn.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 645, Price codes: A06 in paper copy, A01 in microfiche. Environmental Protection Agency. Report EPA-600/5-75-018. June 1975. 99 p, 8 fig, 63 ref, 3 append. R 802836-01-0.

Descriptors: *Environment, *Institutions, *Decision-making, *Management, *Comprehensive planning, *Land use, *Water quality, Coastal areas, Air quality, Flooding, Soils, Seismic studies, Wildlife, Recreation, Transportation, Zoning, *California.
Identifiers: *Malibu(CA), Santa Monica Mountains, Special purpose agencies, Socioeconomic environment, South Coast Regional Commission(CA), General Plan for Los Angeles County(CA), Pepperdine University(CA).

An attempt is made to identify and assess the role of government agencies in the planning and decision-making processes affecting land use, coastal resources, air quality, water quality, flooding, soils, seismic safety, wildlife, recreation and transportation in the Malibu watershed area. Regulatory controls on development include building permits, Coastal Commission permits, air quality controls, water quality controls, and the availability of essential services such as water supply, sewage treatment and access roads. Problems with current environmental management include: planners and policy-makers at the local level are not sufficiently responsive to the public; there is poor coordination among local agencies administering regulations governing water quality control sanitation, fire protection and other essential services; no mechanism exists to coordinate regional, state or national special purpose agencies protecting a critical resource, or to resolve conflicts between special purpose agency objectives and policies; delays in preparation and implementation of plans may give time for actions to be taken which reduce the effectiveness of those plans or controls. Recommendations are: special purpose agencies should be coordinated at the state level by an umbrella agency, which would take over the role of comprehensive planning; a special agency should be established to protect the special environmental significance of the Santa Monica Mountains; reforms to provide checks and balances on the Board of Supervisors and Regional Planning Commission should be instituted. (Gentry-North Carolina)
W77-00769

CONTRACTING FOR SOCIAL IMPACT ASSESSMENT,
G. E. Willeke, and C. A. Willeke.
Prepared for the Army Corps of Engineers, Institute for Water Resources, Fort Belvoir, VA. Final Report. IWR Contract Report 76-1, June 1976. 39 p, 1 tab, 3 ref, append. DACW31-75-M-1574.

Descriptors: *Contracts, *Research and development, *Social aspects, *Economic impact, *Social impact.
Identifiers: *Social Impact Assessments(SIA), National Environmental Policy Act of 1969.

Social Impact Assessments (SIA) have become increasingly more important since the passage of the National Environmental Policy Act of 1969. The problems a contracting agency (usually an Army Engineer District) faces are locating the best qualified contractors in the new field (a market development problem), writing an adequate Statement of Work Tasks, and adequately monitoring the contract and utilization of results. At the District and Division level, recommendations are: supplement advertising in Commerce Business Daily with ads in newsletters and journals, presentations at meetings and direct solicitation; addition of social scientists to District and Division staffs; improving the Scope of Work statement; use of fuller range of contracting options, such as limited competition for contracts; consolidating related SIAs into a single contract; have more than one person monitor a contract. Recommendations for the Headquarters level are: have more planners and project coordinators attend courses on contracting; facilitate feedback of Office of the Chief of Engineers (OCE) and Board of Engineers for Rivers and Harbors (BERH) reactions to impact assessments; OCE should publish a summary of the Corps' budget each year; OCE, through the Institute for Water Resources (IWR), should accumulate files on the social impact of water resources facilities and programs; develop and refine computer and data base capability; encourage use of questionnaires and interview schedules; the Department of Commerce should consolidate SIA contract advertisements into a specified area in the Commerce Business Daily so that the periodical will be more effective in reaching SIA contractors. (Gentry-North Carolina)

W77-00771

GUIDE PLAN REPORT, ANDROSCOGGIN RIVER BASIN, MAINE AND NEW HAMPSHIRE, REGIONAL AND INTERSTATE OVERVIEW.
New England River Basins Commission, Boston, Mass.
For primary bibliographic entry see Field 6B.
W77-00774

MODEL ANALYSIS OF EFFECTS ON WATER LEVELS AT INDIANA DUNES NATIONAL LAKESHORE CAUSED BY CONSTRUCTION DEWATERING,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 4B.
W77-00863

MARINE AND ESTUARINE SANCTUARIES. PROCEEDINGS OF THE NATIONAL WORKSHOP ON SANCTUARIES, 28-30 NOVEMBER 1975, WASHINGTON, D. C.,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 2L.
W77-00888

THE SOCIAL AND ECONOMIC IMPORTANCE OF THE CARONI SWAMP IN TRINIDAD AND TOBAGO,
Michigan Univ., Ann Arbor. Dept. of Natural Resources.
B. S. Ramdial.
Ph. D. Thesis, 1975. 269 p, 24 fig, 9 tab, 9 append.

Descriptors: Mangrove swamps, Ecosystems, Evaluation, Fishing, Shellfish, Natural resources, *Swamps, Land use, Recreation demand, Resources, Tourism, National Parks, Economics, Social values, Water resources, Lagoons, Estuaries, Wetlands.
Identifiers: Trinidad, Tobago, Fin fish, Caroni Swamp(Trinadad-Tobago).

The purpose of this study was to assess the social and economic values of the Caroni Swamp as of 1974 and to generate more attention and wider public interest in one of Trinidad and Tobago's most beautiful landscapes. The study finds various unmet need states such as temporary escape, experiencing nature, intellectual stimulation, affiliation, achievement and physical exercise are gratified by a visit to the Swamp. Over 90% of the visitors thought it worthy of preservation. The study estimates the recreational resources of the Swamp at $1,038,500 and the number of persons earning a living at 240 full-time and 105 part-time. It estimates the fin and shell fish harvest and value at 1,580,170 lbs. and $981,450 and based on a total annual return of $2,020,020, calculates the present worth of the Swamp at $4,000 per acre. The study concludes that the Swamp, though neglected, has many social and economic values beyond tourism. It is biologically productive and it is recommended that the Swamp be declared a National Park. (NOAA)
W77-00893

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 1. MARINE MAMMALS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
NOAA, Environmental Research Laboratories Principal Investigator's Reports for the Year Ending March 1976, April 1976, 434 p.

Descriptors: *Mammals, *Resources development, *Environmental effects, *Continental shelf, Ecology, *Alaska, Remote sensing, *Marine animals, Assessments, Distribution, Ice, Sea ice, Life history studies, Marine biology, Baseline studies, *Oil pollution.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, Seals, Whales, Trophic relationships, Otters.

This is the first volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Analysis of Marine Mammal Remote Sensing Data; Baseline Characterization: Marine Mammals; Abundance and Seasonal Distribution of Marine Mammals in the Gulf of Alaska; Resource Assessment; Abundance and Seasonal Distribution of Bowhead and Belukha Whales - Bering Sea; Abundance and Seasonal Distribution of Bowhead and Belukha Whales - Beaufort Sea, Northeastern Chukchi Sea; Morbidity and Mortality of Marine Mammals; Biology of the Harbor Seal; The Natural History and Ecology of the Bearded Seal and the Ringed Seal; An Aerial Census of Spotted Seals; Trophic Relationships Among Ice Inhabiting Phocid Seals; Assessment of the Distribution and Abundance of Sea Otters Along Kenai Peninsula, Kamishak Bay and the Kodiak Archipelago; Distribution and Abundance of Sea Otters in Southwestern Bristol Bay; Population Assessment, Ecology, and Trophic Relationships of Steller Sea Lions in the Gulf of Alaska; and The Relationships of Marine Mammal Distributions, Densities, and Activities of Sea Ice Conditions. (NOAA)
W77-00901

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 2, MARINE BIRDS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
NOAA, Environmental Research Laboratories Principal Investigator's Reports for the Year Ending March 1976, April 1976, 601 p.

Descriptors: *Resources development, *Environmental effects, *Birds, *Habitats, *Migratory birds, Breeding, *Alaska, *Continental Shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems, *Oil pollution.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, *Seabirds.

This is the second volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the Environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Identification, Documentation, and Delineation of Coastal Migratory Bird Habitat in Alaska; A census of Seabirds on the Pribilof Islands; Ecosystem Dynamics - Birds and Marine Mammals; The Reproductive Ecology, Foods, and Foraging Areas of Seabirds Nesting on St. Paul Island, Pribilof Islands; Breeding Ecology of the Gulf of Alaska Herring Gull Group (Larus argentatus and Larus glaucescens); Community Structure, Distribution, and Interrelationships of Marine Birds in the Gulf of Alaska; Shorebird Dependence on Arctic Littoral Habitats; Avifaunal Utilization of the Offshore Island near Prudhoe Bay, Alaska; and Seabirds on the South Shore of Seward Peninsula, Alaska. (NOAA)
W77-00902

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 3. MARINE BIRDS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
NOAA, Environmental Research Laboratories Principal Investigator's Reports for the Year Ending March 1976, April 1976, 647 p.

Descriptors: *Resources development, *Environmental effects, *Alaska, *Continental Shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems, Birds, Breeding, Habitats, Migratory birds, *Oil pollution.
Identifiers: *Gulf of Alaska, *Outer Continental Shelf, Bering Sea, Beaufort Sea, Pack ice.

This is the third volume in a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Ecology and Behavior of Southern Hemisphere Shearwaters (Gonus Puffinus) and Other Seabirds, when over the Outer Continental Shelf of the Bering Sea and Gulf of Alaska during the Northern Summer; The Distribution, Abundance, and Feeding Ecology of Birds Associated with the Bering Sea and Beaufort Sea Pack Ice; and Seasonal Distribution and Abundance of Marine Birds. Part I. (NOAA)
W77-00903

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 4. MARINE BIRDS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
NOAA, Environmental Research Laboratories Principal Investigators' Reports for the Year Ending March 1976, April 1976. 362 p, numerous fig, tab, ref.

Descriptors: *Resources development, *Environmental effects, *Alaska, *Continental shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems, *Birds, Habitat, Migratory birds, Population, *Oil pollution.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, *Seabirds, Population dynamics, Trophic relationships.

This is the fourth volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Seasonal Distribution and Abundance of Marine Birds: Part 2. Aerial Surveys; Preliminary Catalog of Seabird Colonies and Photographic Mapping of Seabird Colonies; Review and Analysis of Literature and Unpublished Data on Marine Birds; Migration of Birds in Alaskan Coastal and Marine Habitats Subject to Influence by OCS Development; Feeding Ecology and Trophic Relationships of Alaskan Marine Birds; and Population Dynamics of Marine Birds. (NOAA)
W77-00904

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 5. FISH, PLANKTON, BENTHOS, LITTORAL.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
NOAA, Environmental Research Laboratories Principal Investigators' Reports for the Year Ending March 1976, April 1976, 715 p.

Descriptors: *Resources development, *Environmental effects, *Alaska, *Continental Shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems, *Fish, *Plankton, *Benthos, *Littoral, Productivity, *Oil pollution.
Identifiers: *Outer Continental Shelf, *Beaufort Sea, *Bering Sea.

This is the fifth volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: The Distribution, Abundance, Diversity, and Productivity of Benthic Organisms in the

Bering Sea: The Distribution, Abundance, Diversity, and Productivity of the Western Beaufort Sea Benthos; and Summarization of Existing Literature and Unpublished Data on the Distribution, Abundance, and Life Histories of Benthic Organisms of the Beaufort Sea. (NOAA)
W77-00905

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 6. FISH, PLANKTON, BENTHOS, LITTORAL.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
NOAA Environmental Research Laboratories Principal Investigators' Reports for the Year Ending March 1976, April 1976, 587 p.

Descriptors: *Resources development, *Environmental effects, *Alaska, *Continental Shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems, *Fish, *Plankton, *Benthos, *Littoral, Productivity, *Oil pollution.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, *Beaufort Sea, *Bering Sea.

This is the sixth volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Herring Spawning Surveys - Southern Bering Sea; Razer Clam Habitat Survey - Gulf of Alaska; Kenai Peninsula Study of Littoral Zone: A Description and Numerical Analysis of the Factors Affecting the Processes of Production in the Gulf of Alaska; Review and Evaluation of Historical Data Base on Non-Salmonid Pelagic Resources of the Gulf of Alaska Shelf and Slope; and Baseline Characterization: Littoral Biota, Gulf of Alaska and Bering Sea. (NOAA)
W77-00906

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 7. FISH, PLANKTON, BENTHOS, LITTORAL.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
NOAA, Environmental Research Laboratories Principal Investigators' Reports for the year Ending March 1976, April 1976, 675 p.

Descriptors: Resources development, *Environmental effects, *Alaska, *Continental shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems, *Fish, *Benthos, *Littoral, *Plankton, Productivity, *Oil pollution.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, *Bering Sea, *Beaufort Sea.

This is the seventh volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Plankton of the Gulf of Alaska-Ichthyoplankton; Plankton of the Gulf of Alaska-Initial Zooplankton Investigations; Phytoplankton of the Gulf of Alaska; Zooplankton and Micronekton in the Bering-Chukchi/Beaufort Seas; Phytoplankton Studies-Bering Sea; Baseline Studies of Demersal Resources of the Northern Gulf of Alaska Shelf; Baseline Studies of Demersal Resources of the Eastern Bering Sea Shelf; Beaufort Sea Estuarine Fishery Study; The Distribution, Abundance, Diversity and Productivity of Benthic Organisms in the Gulf of Alaska; A Summarization of Existing Literature and Unpublished Data on the Distribution, Abundance, and Productivity of Benthic Organisms of the Gulf of Alaska and Bering Sea; Food and Feeding Relationships in the Benthic and Demersal Fishes of the Gulf of Alaska and Bering Sea; Preparation of Illustrated Keys to Skeletal Remains and Otoliths of Forago Fishes/Literature Search and Data Conversion on Density Distribution of Fishes of Beaufort Sea; Alaska Marine Ichthyoplankton Key; Littoral Survey of the Beaufort Sea; and Beaufort Sea Plankton Studies. (NOAA)
W77-00907

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 8, EFFECTS OF CONTAMINANTS.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
NOAA, Environmental Research Laboratories Principal Investigators' Reports for the Year Ending March 1976, April 1976. 392 p.

Descriptors: Resources development, *Environmental effects, *Toxicity, Pollutants, *Oil pollution, *Photosynthesis, *Water pollution effects, *Alaska, *Continental Shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems, Fishes.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, Bering Sea, *Hydrocarbons, *Biological effects, *Petroleum hydrocarbons, *Sea grasses, Contaminants, Petroleum, Sublethal effects, Trace metals, Arctic Oceans, Subarctic waters, Crude oil.

This is the eighth volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: The Physiological Effect of Acute and Chronic Exposure to Hydrocarbons and of Petroleum on the Near-Shore Fishes of the Bering Sea; Physiological Impact of Oil on Pinnipeds; Acute and Chronic Toxicity, Uptake, and Depuration and Sublethal Metabolic Response of Alaskan Marine Organisms to Petroleum Hydrocarbons; Sublethal Effects as Reflected by Morphological, Chemical, Physiological, and Behavioral Indices; Identification of Major Processes in Biotransformations of Petroleum Hydrocarbons and Trace Metals Assessment of Available Literature on Effects of Oil Pollution on Biota in Arctic and Subarctic Waters; Acute Effects - Pacific Herring Roe in Gulf of Alaska: Acute and Chronic Toxicity of Sea-Water Extracts of Alaskan Crude Oil to Zoese of the Dungeness Crab, Cancer magister, Dana; and Sublethal Effects - Effects on Seagrass Photosynthesis. (NOAA)
W77-00908

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 9. CHEMISTRY AND MICROBIOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
NOAA, Environmental Research Laboratories Principal Investigators' Reports for the Year Ending March 1976, April 1976. 555 p.

Descriptors: Resources development, *Environmental effects, Pollutants, *Sea ice, *Aromatic compounds, *Trace elements, *Alaska, *Continental shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems, *Chemistry, *Microbiology, Microorganisms.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, Bering Sea, Beaufort Sea, Petroleum, Hydrocarbons.

This is the ninth volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Assessment of Potential Interactions of Microorganisms and Pollutants Resulting from Petroleum Development on the Outer Continental Shelf in the Beaufort Sea; Assessment of Potential Interactions of Microorganisms and Pollutants Resulting from Petroleum Development on the Outer Continental Shelf in the Gulf of Alaska: Trace Hydrocarbon Analysis in Previously Studied Matrices and Methods Development for: (A) Trace Hydrocarbon Analysis in Sea Ice and at the Sea Ice-Water Interface, (B) Analysis of Individual High Molecular Weight Aromatic Hydrocarbons; Environmental Assessment of Alaskan Waters - Trace Element Methodology - Inorganic Elements; and Distribution of Light Hydrocarbons, C1-C4, in the Gulf of Alaska and Southeastern Bering Shelf. (NOAA)
W77-00909

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 10. CHEMISTRY AND MICROBIOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
NOAA, Environmental Research Laboratories Principal Investigators' Reports for the Year Ending March 1976, April 1976. 436 p.

Descriptors: Resources development, *Environmental effects, *Oil pollution, *Pathology, *Heavy metals, *Alaska, *Continental Shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems, Bacteria.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, Bering Sea, Beaufort Sea, Crude oil, Psychrophilic bacteria.

This is the tenth volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Natural Distribution of Trace Heavy Metals and Environmental Background in Three Alaskan Shelf Areas; Baseline Study of Microbial Activity in the Beaufort Sea and Gulf of Alaska and Analysis of Crude Oil Degradation by Psychrophilic Bacteria; Hydrocarbons: Natural Distribution and Dynamics on the Alaskan Outer Continental Shelf; Microbial Release of Soluble Trace Metals from Oil-Impacted Sediments; and Incidence of Pathology of Marine Fish Diseases in the Gulf of Alaska, Bering Sea, and Beaufort Sea. (NOAA)
W77-00910

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME II. PHYSICAL OCEANOGRAPHY AND METEOROLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
NOAA, Environmental Research Laboratories Principal Investigators' Reports for the Year Ending March 1976, April 1976. 996 p.

Descriptors: Resources development, *Environmental effects, *Oceanography, *Meteorology, Pollutants, *Continental Shelf, *Alaska, Ecology, Baseline studies, Assessments, Ecosystems, Ocean currents, Ocean circulation, Climatology, *Oil pollution.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, Bering Sea, Beaufort Sea, Oceanographic data, Current measurements, Water masses, Atmospheric models.

This is the eleventh volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Development and Operation of HF Current-Mapping Radar Units-

Physical Oceanography; Beaufort Shelf Surface Currents; Current Measurements in the Beaufort Sea; Effects of Seasonability and Variability of Streamflow on Nearshore Coastal Areas; Gulf of Alaska Study of Mesoscale Oceanographic Processes (Gas-MOP); Numerical Studies of Alaskan Region; Bristol Bay Oceanographic Processes (B-BOP); STD Mappings of the Beaufort Sea Shelf; Outer Continental Shelf Energy Program; Preparation of Hydrodynamical-Numerical and Three-Parameter Small-Mesh Atmospheric Models for Coastal Waters in the Gulf of Alaska; Mesoscale Currents and Water Masses in the Gulf of Alaska; Historical and Statistical Oceanographic Data Analysis and Ship of Opportunity Program; Transport of Pollutants in the Vicinity of Pradhoe Bay; Marine Climatology of the Gulf of Alaska and the Bering and Beaufort Seas; Physical Oceanography of the Gulf of Alaska; and Near-Shore Atmospheric Modification. (NOAA)
W77-00911

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 12. GEOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
NOAA, Environmental Research Laboratories Principal Investigators' Reports for the Year Ending March 1976, April 1976. 679 p.

Descriptors: Resources development, *Environmental effects, Hazards, *Seismic studies, *Volcanoes, *Sedimentation, *Glacial sediments, *Geomorphology, *Permafrost, *Geology, *Alaska, *Continental shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems, Suspended solids, Ice cover, *Oil pollution.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, Pribilof Islands, Aleutian Islands.

This is the twelfth volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Seismotectonic Study of the Seismic and Volcanic Hazards in Pribilof Islands - Eastern Aleutian Islands Region of the Bering Sea; Coastal Morphology and Sedimentation, Gulf Coast of Alaska (Glacial Sedimentation); The Environmental Geology and Geomorphology of the Gulf of Alaska Coastal Plain; Delineation and Engineering Characteristics of Permafrost beneath the Beaufort Sea; Distribution, Composition and Transport of Suspended Particulate Matter in the Gulf of Alaska and Southeastern Bering Shelf; Offshore Permafrost Studies, Beaufort Sea; and Marine Environmental Problems in the Ice Covered Beaufort Sea Shelf and Coastal Regions. (NOAA)
W77-00912

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 13. GEOLOGY.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
NOAA, Environmental Research Laboratories Principal Investigator's Reports for the Year Ending March 1976, April 1976. 430 p.

Descriptors: Resources development, *Environmental effects, *Alaska, *Continental Shelf, Ecology, Assessments, Distribution, Baseline studies, *Geology, *Permafrost, *Benthos, Seismology, *Earthquakes, *Sedimentation, Erosion, Deposition, *Oil pollution.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, St George Basin, Coastal processes.

This is the thirteenth volume of a set of fourteen which present baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: Faulting and Slope-Instability in the St. George Basin Area and Immediately Adjacent Continental Shelf and Upper Continental Slope of the Southern Bering Sea; Yukon Delta Coastal Processes Study; Fault History of Pribilof Islands and its Relevance to Bottom Stability in St. George Basin; Earthquake Activity and Ground Shaking in and along the Eastern Gulf of Alaska; Erosion and Deposition of Shelf Sediments: Eastern Gulf of Alaska; Faulting and Instability of Shelf Sediments: Eastern Gulf of Alaska; Seismic and Volcanic Risk Studies-Western Gulf of Alaska; Offshore Permafrost-Drilling, Boundary Conditions, Properties, Processes, and Models; Beaufort Seacoast Permafrost Studies; Benthos-Sedimentary Substrate Interactions; Faulting and Instability of Shelf Sediments: Western Gulf of Alaska; Seismicity of the Beaufort Sea, Bering Sea, and Gulf of Alaska; and A Study of Beaufort Sea Coastal Erosion, Northern Alaska. (NOAA)
W77-00913

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME 14. ICE.
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
NOAA, Environmental Research Laboratories Principal Investigators' Reports for the Year Ending March 1976, April 1976. 459 p.

Descriptors: Resources development, *Environmental effects, *Ice, *Oil pollution, *Sea ice, Remote sensing, *Alaska, *Continental Shelf, Ecology, Baseline studies, Assessments, Distribution, Ecosystems.
Identifiers: *Outer Continental Shelf, *Gulf of Alaska, Near shore ice, Morphology.

This is the fourteenth volume of a set of fourteen which presents baseline studies of the natural resources of the Alaska Continental Shelf as well as studies of the environmental effects of the development of the resources in that area with particular emphasis on oil pollution. This volume contains the following studies: The Interaction of Oil with Sea Ice in the Arctic Ocean; Dynamics of Near-Shore Ice (Near-Shore Radar Transponder and Fast Ice Studies); Dynamics of Near-Shore Sea Ice in Shear Zone (Data Buoys); Study of Climatic Effects on Fast Ice Extent and Its Seasonal Decay Along the Beaufort Sea Coast; Mechanics of Origin of Pressure Ridges, Shear Ridges and Hummock Fields in Landfast Ice; Morphology of Bering Near-Shore Ice Conditions by Means of Satellite and Aerial Remote Sensing; Morphology of Beaufort Near-Shore Ice Conditions by Means of Satellite and Aerial Remote Sensing; Experimental Measurements of Sea Ice Failure Stresses Near Grounded Structures; Beaufort Sea, Chukchi Sea, Bering Strait Historical Baseline Ice Study; Development of Hardware and Procedures for In-Sity Measurement of Creep in Sea Ice and Operation of an Alaskan Facility for Applications of Remote-Sensing Data to Outer Continental Shelf Studies. (NOAA)
W77-00914

WISCONSIN NATURAL RESOURCE USE CONTROLS AND ASSISTANCE.
Wisconsin Dept. of Natural Resources, Madison.
For primary bibliographic entry see Field 6E.
W77-00915

CARRYING CAPACITY PROTOTYPE INVESTIGATIONS IN THE STATE OF HAWAII, SUMMARY REPORT,
Hawaii State Office of Environmental Quality Control, Honolulu. Steering Committee on Carrying Capacity Studies.
February 1976. 48 p. 8 fig.

Descriptors: *Carrying capacity, *Growth rates, *Environment, *Natural resources, *Human population, Planning, *Hawaii, Water supply, Water quality, Model studies, Stress, Methodology, Decision Making.
Identifiers: *Overpopulation, Environmental stress, Prototype studies, Maui(Hawaii), Oahu(Hawaii), Pearl Harbor(Hawaii).

The limited capacity of environmental systems to absorb growth and of resource systems to support growth, and the corresponding need to base future growth management decisions on an understanding of such limits are the underlying motives for the carrying capacity determinations of single systems while acknowledging that other interrelated systems may combine in synergistic and antagonistic effects. These studies were aimed at acquiring first-hand experience in dealing with the carrying capacity concept by addressing it to specific locations and from the perspective of representative resource and environment-related concerns. The procedures developed and used in these investigations characterize the elements of a methodology that are generalizable as a decision-making tool. The prototype studies were directed to a single system approach, i.e., on the provision of a water supply and the maintenance of water quality in specific segments of Hawaii, and to provide meaningful and practical results while stressing the need for an integrated approach to carrying capacity studies in order to address the spheres of decision-making related to growth, infrastructure and support systems, and to criteria and standards. Determination of various carrying capacities and their main implications provide a display of major tradeoffs associated with achieving selected environmental standards. (Auen-Wisconsin)
W77-00917

OPTIMAL TAXATION POLICIES FOR CONSERVATION AND RECYCLING,
Florida Univ., Gainesville. Dept. of Economics.
R. Lusky.
Journal of Economic Theory, Vol. 11, No. 3, p. 315-328, 1975. 5 fig., 5 ref.

Descriptors: *Recycling, *Administrative decisions, *Conservation, National resources, Mathematical models, Pollutants, Taxes, Government finance, Pollution charges(Taxes).

A fully integrated model of conservation, pollution, and recycling is presented in a framework of a natural resource cycle—beginning with extraction from a stock of the resource, moving to intermediate production, final consumption, and closed by recycling the consumption residuals. It is assumed that the natural resource stock affects the utility and the recycling activity. In a laissez-faire market equilibrium, consumers and producers fail to take into account the dynamic effect of the stock of resources due to lack of appropriability; when deciding upon the optimal rate of extraction and recycling, no one takes into account his individual effect upon the stock nor the effect of the stock upon his own consumption and production. This failure results in a suboptimal rate of resource extraction. The model shows that centralized decision-making internalizes the stock externality and thereby produces the optimal allocation solution. Optimality can also be reached in a decentralized system with the use of the proper tax-cum-subsidy scheme. In the recycling model where the destination of the recycled material is the original stock, the optimal solution involves a subsidy to firms engaging in recycling activities; this subsidy, which is separated from the necessary decentralized tax plan, was found to be equal to the value of an extra unit of the resource. (Auen-Wisconsin)
W77-00921

ENVIRONMENTAL PROTECTION AND SPATIAL ALLOCATION OF INVESTMENTS,
Erasmus Univ., Rotterdam (Netherlands).
A. P. Mastenbroek, and P. Nijkamp.

International Regional Science Review, Vol. 1, No. 1, p. 73-86, 1975. 2 fig., 1 tab., 8 ref.

Descriptors: *Pollution abatement, *Mathematical models, *Investment, *Evaluation, Standards, Planning, Economic efficiency, Air pollution, Water pollution, Decision making.
Identifiers: *Environmental damages, *Environmental standards.

A linear programming model is presented based on multiple sectors, multiple regions and multiple pollutants (thus including input-output linkages and spillover effects) defines spatial allocation of investment activities both for productive and environmental purposes. It is designed for planning economic activities which have environmental impacts and provides a quantitative basis for environmental administration, for planning of investment projects, for tax/subsidy regulations, etc. It incorporates environmental standards which could not be exceeded whatever the volume of industrial production, or private consumption and of transportation may be. The implicit economic evaluation of environmental standards is reflected by shadow prices. The regional surplus (the sum of the aggregated sectoral values minus the sum of the costs of environmental deterioration in each region) is maximized subject to a set of constraints. A comparison of the effects of an increase in the damage costs of pollution (via charges or taxes) to the effects of a policy of reducing admissible levels of pollution (by imposing quality standards) shows that the latter policy is relatively more effective. The shadow prices of emission standards give indications of the societal valuation of these standards. A nonlinear extention of the environmental model focuses on the shape of the cost curve of environmental deterioration as well as on the cost effects of environmental protection and pollution control. (Auen-Wisconsin)
W77-00922

THE INTERNATIONAL LAW OF THE SEA: A CASE FOR A CUSTOMARY APPROACH,
South Carolina Univ., Columbia. School of Marine Science.
For primary bibliographic entry see Field 6E.
W77-00956

1974 ANNUAL REPORT, (WASHINGTON NATURAL RESOURCES AND RECREATION AGENCIES).
For primary bibliographic entry see Field 5G.
W77-00957

7. RESOURCES DATA

7A. Network Design

(WATERSHED MANAGEMENT AND DECISION MAKING IN RELATION TO COMPUTER HARDWARE, COMMUNICATIONS AND SOFTWARE DESIGN),
Hydrocomp, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 7C.
W77-00619

ANALYSIS OF HISTORICAL WATER-QUALITY DATA AND DESCRIPTION OF PLAN FOR A SAMPLING NETWORK IN CENTRAL AND SOUTHERN FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5A.
W77-00858

HYDROLOGY OF FLOOD MITIGATION MEASURES IN THE PAHANG RIVER BASIN, MALAYSIA - A CASE STUDY,
For primary bibliographic entry see Field 4A.
W77-00946

7B. Data Acquisition

DEVELOPMENT OF A SYSTEM TO DETECT AND MONITOR SEDIMENT POLLUTION,
Rhode Island Univ., Kingston. Dept. of Civil and Ocean Engineering.
For primary bibliographic entry see Field 5B.
W77-00539

A SIMPLE TUBE-TYPE WATER PROFILE SAMPLER,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5A.
W77-00641

AN INEXPENSIVE THERMISTOR FLOWMETER FOR AQUATIC BIOLOGY,
Duke Univ., Durham, N. C. Dept. of Zoology.
M. LaBarbera, and S. Vogel.
Limnology and Oceanography, Vol. 21, No. 5, p 750-756, September 1976. 4 fig, 7 ref.

Descriptors: *Instrumentation, *Flowmeters, *Flow measurement, Flow rates, Equipment, Electronics, Electronic equipment, Measurement, Calibrations, Anemometer, Aquatic environment, Aquatic life, Biology.
Identifiers: *Thermistor flowmeters, Thermistors.

A newly developed thermistor flowmeter could measure current speeds from 0.2 to 50 cm/s with a spatial resolution of 0.1 cm and a response time of 200 ms. The output of the meter approximated a logarithmic function of the ambient water velocity. The flowmeter itself had a low power consumption, and the output could be stored on magnetic tape using a bettery-powered cassette recorder, which made possible a continuously recording portable or self-contained underwater unit. (Sims-ISWS)
W77-00645

RESEARCH FOR THE DEVELOPMENT OF GUIDELINES FOR CONDUCTING AND ANALYZING AN ENVIRONMENTAL WATER QUALITY STUDY TO DETERMINE STATISTICALLY MEANINGFUL RESULTS,
Arkansas Univ., Fayetteville. Water Resources Research Center.
M. D. Springer.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-259 496, Price codes: A08 in paper copy, A01 in microfiche. Arkansas Water Resources Research Center, Publication No. 37, Engineering Experiment Station, Research Report No. 26, March 1976. 164 p, 26 tab, 16 ref, append. OWRT A-033-ARK(1), 14-34-0001-5057.

Descriptors: *Model studies, *Methodology, *Statistical methods, *Statistical models, Data collections, Estimating, Testing procedures, Analytical techniques, Correlation analysis, Regression analysis, Sampling, Water quality.

This report presents and discusses the basic statistical models and methods which are useful to researchers in the field of water resources research, as well as in other fields. These models and methods are presented from the standpoint of type (parametric and nonparametric - or distribution free) and purpose (e.g., simulteneous comparison of several means, comparison of two or more variances, establishment of a difference between two means with a specified confidence, etc.). Emphasis is primarily upon methodology; necessary assumptions upon which each model is based are included. No derivations or proofs are given, since these are found in numerous textbooks on statistics. Emphasis is also placed upon the need for the researcher to determine before obtaining data the type of statistical model and analysis required, so that he can use that model or method which is most powerful, and so that he will have the proper data to permit the most efficient analysis. Failure to carry out such preliminary planning relevant to the selection and application of a statistical model will almost result in either a lack of sufficient relevant data or in the gathering of extraneous data, either of which is unnecessarily costly. Each method is illustrated by an example, together with an interpretation of the result.
W77-00677

A TIME RELATED AUTOMATIC TOTAL-LOAD SEDIMENT SAMPLER,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 2J.
W77-00843

THE USE OF COLOR INFRARED PHOTOGRAPHY FOR THE DETERMINATION OF SUSPENDED SEDIMENT CONCENTRATIONS AND SOURCE AREAS,
Forest Service (USDA), Fort Collins, Colo. Arapaho-Roosevelt National Forest.
For primary bibliographic entry see Field 2J.
W77-00844

GAGING SEDIMENT-LADEN FLOWS WITH V-NOTCH WEIRS,
Agricultural Research Service, Columbia, Mo. North Central Watershed Research.
For primary bibliographic entry see Field 2J.
W77-00845

ACCURACY OF EVAPOTRANSPIRATION RATES DETERMINED BY THE WATER-BUDGET METHOD, GILA RIVER FLOOD PLAIN, SOUTHEASTERN ARIZONA,
Geological Survey, Tucson, Ariz.
For primary bibliographic entry see Field 2D.
W77-00868

WATER RESOURCE EVALUATION USING PHOTOGRAMMETRIC AND REMOTE SENSING TECHNIQUES,
Laurie, Montgomerie and Pettit Ltd., Sydney (Australia).
For primary bibliographic entry see Field 4A.
W77-00937

7C. Evaluation, Processing and Publication

STATISTICAL MODELS FOR PRECIPITATION,
Kentucky Water Resources Research Inst., Lexington.
For primary bibliographic entry see Field 2B.
W77-00537

DEVELOPMENT OF WATER QUALITY SAMPLING PROGRAMS,
Hydrocomp, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 5A.
W77-00618

(WATERSHED MANAGEMENT AND DECISION MAKING IN RELATION TO COMPUTER HARDWARE, COMMUNICATIONS AND SOFTWARE DESIGN),
Hydrocomp, Inc., Palo Alto, Calif.
N. H. Crawford.
Simulation Network Newsletter, Vol. 8, No. 1, p 1-4, January 1976. 2 fig.

Descriptors: Technology, Hydrology, *Computers, *Communication, Water resources development, *Watershed management, *Decision making, Data collections.

Technical advances important to hydrology and water resources are taking place in computer hardware, communications, and software design. A water resource management system requires orderly organization of information, analysis of the consequences of decisions, operational criteria, and a means to implement the decisions that are taken. The most important current trend in computer hardware is toward ultra small and inexpensive logical components. A microcomputer can be built into a raingage or a streamgage, giving these devices decision making power. Transmission of field data to satellites, followed by readout into a data bank is currently being tested in the United States. Such a system is practical even if the data are not used in real-time, if the satellite can collect data at lower cost than the alternate field trip to the gage site. Software needs include data base systems that store, update, and retrieve time series; simulation software to investigate policy and development alternatives; system management software to locate optimum or near optimum control strategies; and interactive or conversational linkages between the user and the other types of software. The cost of software in water resource systems already exceeds the hardware costs and will probably increase. (Snyder-FIRL)
W77-00619

COMPUTERIZED CITY-WIDE CONTROL OF URBAN STORMWATER,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W77-00634

EVALUATING GROUND-WATER PATHS USING HYDRAULIC CONDUCTIVITIES,
Agricultural Research Service, Chickasha, Okla. Texas-Oklahoma Area.
For primary bibliographic entry see Field 2F.
W77-00651

HYDROGEOPHYSICAL EQUIVALENCE OF WATER SALINITY, POROSITY AND MATRIX CONDUCTION IN ARENACEOUS AQUIFERS,
National Physical Research Lab., Pretoria (South Africa). Geophysics Div.
For primary bibliographic entry see Field 2F.
W77-00652

RESEARCH FOR THE DEVELOPMENT OF GUIDELINES FOR CONDUCTING AND ANALYZING AN ENVIRONMENTAL WATER QUALITY STUDY TO DETERMINE STATISTICALLY MEANINGFUL RESULTS,
Arkansas Univ., Fayetteville. Water Resources Research Center.
For primary bibliographic entry see Field 7B.
W77-00677

PROGRAM SPECIFICATION FOR THE SEWER AND WATER ACCOUNTS PROCESSING MODULE - READING USAC PROJECT.
For primary bibliographic entry see Field 5G.
W77-00773

DIGITAL SIMULATION OF AGGRADATION AND DEGRADATION IN NATURAL STREAMS,
New South Wales Univ., Kensington (Australia). Faculty of Military Studies.
For primary bibliographic entry see Field 2J.
W77-00818

WATER RESOURCES OF THE ROCK RIVER WATERSHED, SOUTHWESTERN MINNESOTA,
Geological Survey, St. Paul, Minn.
H. W. Anderson, Jr., W. L. Broussard, D. F. Farrell, and P. E. Felsheim.
Available from Branch of Distribution, USGS, 1200 S. Eads St., Arlington, Va 22202, price $1.75. Hydrologic Investigations Atlas HA-555, 1976. 3 sheets, 14 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater, *Water quality, *Minnesota, Water supply, Hydrologic data, Streamflow, Floods, Low flow, Hydrogeology, Aquifer characteristics, Groundwater movement, Dissolved solids, Duration curves, Hydrographs, Maps.
Identifiers: *Rock River(Minn), Missouri River tributary.

This Hydrologic Atlas is one of series describing the 39 watershed units in Minnesota. The 1,750 sq mi in the Rock River watershed are glaciated upland plain including all of Rock County and parts of Pipestone, Murray, Lincoln, Nobles and Jackson Counties. The average annual water budget shows 25.8 inches precipitation, 3.1 inches surface runoff and 22.7 inches evapotranspiration. Water use in million gallons for 1970 was 3,333 ground water and 274 surface water. Domestic supplies accounted for 37 percent livestock 37 percent, and industrial 26 percent of total use. All 18 municipalities use ground water, mostly from glacial drift, seven use water from Precambrian aquifers. Precipitation recharges ground water through glacial deposits. Water-table and potentiometric maps and section show ground-water movement. Highest streamflow results from snowmelt and spring rains followed by recession in flow through summer, fall, and winter. Surface water and ground water are both very hard. Surface water and water from surficial and shallow drift aquifers generally range from 450 to 1,000 mg/liter dissolved-solids concentrations. Water from deep drift and from bedrock generally exceeds 1,000 mg/liter dissolved-solids concentration except where Precambiian quartzite aquifers underlie pre-Wisconsin drift. (Woodard-USGS)
W77-00848

WATER RESOURCES OF THE ROOT RIVER WATERSHED, SOUTHEASTERN MINNESOTA,
Geological Survey, St. Paul, Minn.
W. L. Broussard, D. F. Farrell, H. W. Anderson, Jr., and P. E. Felsheim.
Available from Branch of Distribution, USGS, 1200 S. Eads St., Arlington, Va 22202 Price $4.25. Hydrologic Investigations Atlas HA-548, 1976. 3 sheets, 9 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater, *Water quality, *Minnesota, Water supply, Hydrologic data, Streamflow, Flow rates, Hydrogeology, Aquifer characteristics, Groundwater movement, Surface-groundwater relationships, Dissolved solids, Duration curves, Hydrographs, Maps.
Identifiers: *Root River(Minn).

This Hydrologic Atlas is one of a series describing the 39 watersheds in Minnesota. The Root River watershed includes Houston, Winona, and parts of the surrounding counties. The 2,570 square miles in the watershed varies from gently rolling prairie in the west to an area of plateaus separated by valleys deeply incised into bedrock in the north and east. The average annual water budget for 30 years shows 29.5 inches of precipitation, 7.2 inches of surface runoff, and 22.3 inches of evapotranspiration. Water use in millions of gallons for 1970 was established at 7,310 of ground water and 6,700 of surface water. Domestic supplies accounted for less than one fourth and thermoelectric power for about one half of the total use. All 33 municipalities use ground water from bedrock aquifers, and 21 of those obtain at least part of their supply from the Prairie du Chien-Jordan aquifer. Many private domestic wells are completed in a shallow limestone aquifer. The ground-water system is recharged primarily by infiltrating precipitation in upland areas Ground-water movement is indicated by water-table and potentiometric maps and section diagrams. Water from bedrock and glacial aquifers generally is of acceptable quality for domestic use, dissolved solids generally less than 400 mg/liter very hard, and locally high iron content. The Mount Simon-Red clastics aquifer is locally saline. Runoff is greatest during the spring when snowmelt occurs and the soils are generally saturated. (Woodard-USGS)
W77-00849

GEOHYDROLOGY OF THE LOWLAND LAKES AREA, ANCHORAGE, ALASKA,
Geological Survey, Anchorage, Alaska.
C. Zenone.
Water-Resources Investigations 76-22, 1976. 2 sheets, 11 fig, 12 ref.

Descriptors: *Groundwater resources, *Lakes, *Hydrogeology, *Urbanization, *Alaska, Aquifer characteristics, Glacial sediments, Water levels, Water demand, Water utilization, Maps, Surface-groundwater relationships.
Identifiers: *Anchorage(Alaska).

Unconsolidated deposits, chiefly of glacial origin, make up the surficial geologic materials in the Anchorage lowland lakes area, the western part of the Anchorage glacial outwash plain. Postglacial accumulation of peat, commonly 5 to 10 feet thick, and the presence of ground water at or very near the surface combine to create the swamp-muskeg terrane of much of the area. Deeper, confined ground water is also present beneath thick silt and clay layers that underlie the surficial deposits. Domestic water supply for the lowland lakes area is provided largely by public-supply wells completed in the deep, confined aquifers. No large perennial streams traverse the area, thus streamflow is not a major parameter in the area's natural water balance. The major uses of surface water are recreational, including fishing and boating at several of the larger lakes, and private and commercial aircraft operations at Hood-Spenard Lakes floatplane base. The hydrology and water balance of these lakes is complex. Water levels in some lakes appear to be closely related to adjacent ground-water levels. Other lakes are evidently perched above the local water table. The relation of lake level to adjacent ground-water level may vary along the shoreline of a single lake. The effect of residential development practices on lake basin water balance is not completely understood. At Sand Lake, the largest lake in this area of rapid urbanization, the water level has declined about 6 feet since the early 1960's. (Woodard-USGS)
W77-00850

GEOHYDROLOGY AND WATER SUPPLY, SHEYMA ISLAND, ALASKA,
Geological Survey, Anchorage, Alaska.
A. H. Feulner, C. Zonone, and K. M. Reed.
Open-file map report 76-82, 1976. 1 sheet, 4 fig, 1 tab, 6 ref.

Descriptors: *Water supply development, *Surface waters, *Groundwater, *Water quality, *Alaska, Available water, Hydrogeology, Data collections, Surface-groundwater relationships, Maps.
Identifiers: *Shemya Island(Alaska).

Sheyma Island, Alaska, was occupied as a military base in 1942. Since that time, potable water has been supplied by streams, lakes, wells, and in the late 1950's, a gallery system. The island is a low-lying, wave-cut platform composed of pyroclastic and volcanic rocks with some intrusives. Bedrock is overlain by thin glacial deposits. Most of the island's present surface is relatively thick peat deposits. On the southern and western sides of the island active sand dunes are present. Groundwater supplies are limited by the dense bedrock; only a small amount of water penetrates into fracture systems. Most ground-water movement is in the overlying glacial and peat deposits. Ground water moves generally from north to south across the island. Currently water supplies are drawn

from the gallery system which is capable of providing about 200,000 gallons per day. An emergency water supply is available from two wells. Additional supplies could be developed by either adding to the existing gallery or constructing an additional gallery near the present gallery system. The chemical quality of water analyzed from the gallery well generally approximates that of surface water on the island. None of the constituents in samples from streams, lakes, or ground water, except the August 27, 1970, analysis for Lower Lake, exceed the recommended limits for drinking water (Environmental Protection Agency, 1973). (Woodard-USGS)
W77-00851

SIMULATION OF DISSOLVED OXYGEN AND BIOCHEMICAL OXYGEN DEMAND PLANTATION CANAL, BROWARD COUNTY, FLORIDA, WITH AN EVALUATION OF THE QUAL-I MODEL FOR USE IN SOUTH FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W77-00852

GROUND-WATER LEVELS AND WELL RECORDS FOR DISCONTINUED OBSERVATION WELLS IN IDAHO, 1915-72: PART A,
Geological Survey, Boise, Idaho.
H. G. Sisco.
Idaho Department of Water Resources, Boise, Basic-Data Release No 3, Part A, March 1976. 261 p, 12 fig, 40 ref.

Descriptors: *Groundwater, *Water levels, *Well data, *Observation wells, *Idaho, Basic data collections.
Identifiers: *Discontinued observation wells, *Northern and southwest Idaho.

The data collected from observation wells in Idaho are presented in 3 reports (A, B, and C). This report (A) contains all data for discontinued observation wells from 1915-72 in the following counties: Ada, Adams, Boise, Boundary, Canyon, Custer, Elmore, Gem, Kootenai, Latah, Owyhee, Payette, Valley, and Washington. (See also W77-00855 and W77-00856) (Woodard-USGS)
W77-00854

GROUND-WATER LEVELS AND WELL RECORDS FOR DISCONTINUED OBSERVATION WELLS IN IDAHO, 1915-72: PART B,
Geological Survey, Boise, Idaho.
H. G. Sisco.
Idaho Department of Water Resources, Boise, Basic-Data Release No 3, Part B, March 1976. 389 p, 4 fig, 40 ref.

Descriptors: *Groundwater, *Water levels, *Well data, *Observation wells, *Idaho, Basic data collections.
Identifiers: *Discontinued observation wells, *South-central Idaho.

The data collected from observation wells in Idaho are presented in 3 separate reports (A, B, and C). This report (B) contains all data for discontinued observation wells from 1915-72, in the following counties: Blaine, Butte, Camas, Cassia, Gooding, Jerome, Lincoln, Minidoka, and Twin Falls. (See also W77-00854 and W77-00856)
W77-00855

GROUND-WATER LEVELS AND WELL RECORDS FOR DISCONTINUED OBSERVATION WELLS IN IDAHO, 1915-72: PART C,
Geological Survey, Boise, Idaho.
H. G. Sisco.
Idaho Department of Water Resources, Boise, Basic-Data Release No 3, Part C, March 1976. 360 p, 4 fig, 40 ref.

Descriptors: *Groundwater, *Water levels, *Well data, *Observation wells, *Idaho, Basic data collections.
Identifiers: *Discontinued observation wells, *Southeast Idaho.

The data collected from observation wells in Idaho and presented in 3 reports (A, B, and C). This report (C) contains all data for discontinued observation wells from 1915-72 in the following counties: Bannock, Bear Lake, Bingham, Bonneville, Caribou, Clark, Franklin, Fremont, Jefferson, Madison, Oneida, Power, and Teton. (See also W77-00854 and W77-00855) (Woodard-USGS)
W77-00856

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70: PART II. PACIFIC SLOPE BASINS IN CALIFORNIA--VOLUME 2. BASINS FROM ARROYO GRANDE TO OREGON STATE LINE EXCEPT CENTRAL VALLEY.
Geological Survey, Reston, Va.
Available from the Supt. of Documents, GPO, Washington, DC 20402, Price $5.55. Water-Supply Paper 2129, 1976. 678 p, 1 fig.

Descriptors: *Hydrologic data, *Surface waters, *Streamflow, *Lakes, *California, Oregon, River basins, Runoff, Discharge(Water), Gaging stations, Flow measurement, Average flow, Reservoir stages.
Identifiers: *Pacific Slope basins(Calif).

This is one of 37 reports presenting records of stage and discharge of streams, and of stage and contents of lakes and reservoirs in the United States during the 1966-70 water years; it contains the records for gaging stations and partial-record stations in the Pacific slope basins in California from Arroyo Grande to Oregon State line except Central Valley. This report is one of the second series of water-supply papers to be published on a 5-year basis. The first series covered the 5-year period October 1, 1960, to September 30, 1965. This series covers the period October 1, 1965, to September 30, 1970. The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries of total, average, maximum, and minimum, discharges. (Woodard-USGS)
W77-00857

ANALYSIS OF HISTORICAL WATER-QUALITY DATA AND DESCRIPTION OF PLAN FOR A SAMPLING NETWORK IN CENTRAL AND SOUTHERN FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5A.
W77-00858

WATER RESOURCES OF THE WARM SPRINGS INDIAN RESERVATION, OREGON,
Geological Survey Portland, Oreg.
For primary bibliographic entry see Field 4A.
W77-00864

AN EXPERIMENT IN THE PRODUCTION OF 'POP' FORECASTS USING A STATISTICAL MODEL,
National Weather Service, Honolulu, Hawaii. Pacific Region.
For primary bibliographic entry see Field 2B.
W77-00889

A RECORD ARKANSAS RAINFALL - THE EL DORADO DELUGE,
National Weather Service, Fort Worth, Tex. Southern Region.
For primary bibliographic entry see Field 2B.
W77-00897

COASTAL ENGINEERING DATA NETWORK,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 2L.
W77-00898

STATISTICAL, METEOROLOGICAL AND DEPTH-AREA ANALYSIS OF RAINFALL,
Israel Meteorological Service, Bet Dagan; and Israel Ministry of Transport and Communications, Tel-Aviv.
For primary bibliographic entry see Field 2B.
W77-00900

AN APPROACH TO A RELATIVE TROPHIC INDEX FOR CLASSIFYING LAKES AND RESERVOIRS. (A PRELIMINARY ANALYSIS OF NATIONAL EUTROPHICATION SURVEY DATA COLLECTED DURING THE 1972 SAMPLING PERIOD).
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W77-00930

NITROGEN AND PHOSPHORUS IN WASTEWATER EFFLUENTS. (A PRELIMINARY ANALYSIS OF NATIONAL EUTROPHICATION SURVEY DATA COLLECTED DURING 1972-73 SAMPLING PERIOD).
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W77-00931

FREQUENCY ANALYSIS OF FLOOD DATA IN QUEENSLAND (AUSTRALIA),
Department of Primary Industries, Brisbane (Australia).
For primary bibliographic entry see Field 4A.
W77-00936

WATER RESOURCE EVALUATION USING PHOTOGRAMMETRIC AND REMOTE SENSING TECHNIQUES,
Laurie, Montgomerie and Pettit Ltd., Sydney (Australia).
For primary bibliographic entry see Field 4A.
W77-00937

STATISTICS: WHEN WILL WE EVER LEARN,
Queensland Irrigation and Water Supply Commission, Brisbane (Australia). Surface Water Resources Branch.
N. M. Ashkanasy.
In: Hydrology Symposium, Sydney, Australia, 1976. The Institution of Engineers Australia, Preprints of Papers, p. 30 - 34, June 1976. 1 fig., 4 tab., 21 ref.

Descriptors: *Statistical methods, Risks, Forecasting, Frequency analysis, Flood mitigation, Monte Carlo method, Distribution patterns.

Statistics are playing role in engineering evaluation, but doubts exist as to whether engineers' and hydrologists' grasp of the concept of risk is much better than that of the general public. Use of such terms as 'return period' and 'recurrence interval' do nothing to dispell such doubts. A concept of risk is developed based on the product of uncertainty arising out of each step in a statistical evaluation. The basic theory behind development and utilization of frequency distributions is discussed, but it appears that there is little statistical evidence to distinguish between them, especially in the light of the doubts which exist about their underlying assumptions. Recent 'Monte Carlo' experiments indicate furthermore that knowledge of the 'right' distribution is less important than even a limited knowledge about other factors involved in the design of flood alleviation

policies and structures. It is concluded that engineers and hydrologists need to carefully review their attitudes if statistical methods are to be wisely used. (CSIRO)
W77-00938

A STAGE-DAMAGE CURVE FOR THE BRISBANE RIVER (AUSTRALIA),
Snowy Mountains Engineering Corp., Cooma (Australia).
For primary bibliographic entry see Field 4A.
W77-00943

BENEFIT-COST STUDIES IN THE PAHANG RIVER BASIN STUDY (MALAYSIA),
For primary bibliographic entry see Field 4A.
W77-00947

ERAMS SURFACE AND DRINKING WATER COMPONENTS, JANUARY--MARCH 1974.
Office of Radiation Programs, Las Vegas, Nev.
For primary bibliographic entry see Field 5A.
W77-00954

RADIOACTIVITY IN KANSAS SURFACE WATERS, JANUARY--DECEMBER 1972.
Kansas State Board of Health, Topeka. Radiation Control Section.
For primary bibliographic entry see Field 5A.
W77-00955

BOUNDARIES OF ARID REGIONS, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
M. P. Petrov.
Problosooe-Niya Pustyn' 2, p 3-10, 1975.

Descriptors: *Arid lands, *Arid climates, *Regions, Deserts, Grasses, Soils, Dicots, Monocots.
Identifiers: *Boundaries(Arid lands).

When subdividing arid lands climatic, lithoedaphic and landscape boundaries should be distinguished. The climatic boundaries are not definite and dynamic; the boundaries of lithoedaphic types of deserts and semideserts are more definite, mostly linear (monocots, dicots and grasses mentioned). Landscape boundaries are complicated but sometimes linear.—Copyright 1976, Biological Abstracts, Inc.
W77-01032

GENERAL RECORDS AND NEW MORPHOMETRIC DATA FOR AN ENVIRONMENTAL STUDY ON LAKE ISEO, (IN ITALIAN),
Padua Univ. (Italy). Instituto di Botanica e Fisiologia Vegetale.
For primary bibliographic entry see Field 2H.
W77-01041

8. ENGINEERING WORKS

8A. Structures

INFLUENCE OF ICE UPON CONSTRUCTION, AND METHODS OF COMBATTING ICE PROBLEMS.
Army Cold Region Research and Engineering Lab., Hanover, N. H.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-012 005, Price codes: A08 in paper copy, A01 in microfiche. CREEL Draft Translation 422, October 1974. 276 p. Translated from Trudy Koordinatsionnykh Soveshchaniy po Gidroteknike (Translation of Coordinating Conference on Hydraulic Engineering), No. 17, 1965.

Descriptors: *Ice, *Ice cover, *Construction, *Arctic, Cold regions, Ice jams, Cold weather construction, Hydraulic structures, Reservoirs, Harbors, Rivers, Equations, Navigation, Bridges, Civil engineering, Structures.
Identifiers: *Ice cover effects, *Ice loads, Ice pressure, Ice cover strength.

This collection of 25 articles dealt with the variety of ice related factors which influences the specifications for building in an arctic environment. Based on the studies done concerning the effect of ice on completed structures, these articles presented logical approaches to estimating effective ice loads and how to determine the necessary ice protective measures while building reservoirs, hydraulic structures, harbor slips, etc. Several articles were concerned with how to weaken ice strength or increase the rate of thawing. (Sims-ISWS)
W77-00663

EVALUATION OF AN EXTENSIVE SEDIMENT CONTROL EFFORT IN THE LOS ANGELES RIVER BASIN,
Forest Service (USDA), Turlock, Calif. Stanislaus National Forest.
For primary bibliographic entry see Field 4D.
W77-00801

SEDIMENT CONTROL AT IMPERIAL DAM,
Bureau of Reclamation, Yuma, Ariz. Yuma Projects Office.
For primary bibliographic entry see Field 4D.
W77-00802

MODEL ANALYSIS OF EFFECTS ON WATER LEVELS AT INDIANA DUNES NATIONAL LAKESHORE CAUSED BY CONSTRUCTION DEWATERING,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 4B.
W77-00863

ARK-MO FARMS, INC. V. UNITED STATES (PROBLEM OF PROOF IN RECOVERING FOR FLOOD DAMAGE TO CROPS).
For primary bibliographic entry see Field 3F.
W77-01050

8B. Hydraulics

FREE SURFACE FLOW IN A CHANNEL OF LARGE RELATIVE ROUGHNESS,
Technical Univ. of Istanbul (Turkey), Dept. of Hydraulics and Water Power.
For primary bibliographic entry see Field 2E.
W77-00649

FORCES ON A ROUGH BED IN OSCILLATORY FLOW,
Cambridge Univ. (England). Dept. of Engineering.
For primary bibliographic entry see Field 2L.
W77-00650

INFLUENCE OF ICE UPON CONSTRUCTION, AND METHODS OF COMBATTING ICE PROBLEMS.
Army Cold Region Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 8A.
W77-00663

HEAT DISPERSION IN PHYSICAL ESTUARINE MODELS; REPORT 2, EXPERIMENTS IN THE DELAWARE RIVER MODEL,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 5B.
W77-00665

INTEGRAL-EQUATION ANALYSIS OF FLOWS OVER ERODING BEDS,
Mississippi Univ., University. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-00682

WAVE GENERATOR,
For primary bibliographic entry see Field 8C.
W77-00691

HYDRAULIC MODEL STUDIES OF NAVAJO DAM AUXILIARY OUTLET WORKS AND HOLLOW-JET VALVE BYPASS--MODIFICATIONS TO REDUCE DISSOLVED GAS SUPERSATURATION,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 8C.
W77-00739

MODEL STUDY OF THE DRAG COEFFICIENT OF A STREAMBED PARTICLE,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 2J.
W77-00816

CHARACTERISTICS OF STABLE NATURAL CHANNELS AND THEIR RELATION TO CHANNEL DESIGN,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
D. G. DeCoursey, and C. G. Hunt.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 5-13 - 5-24, 1976. 12 tab, 13 ref.

Descriptors: *Channels, *Channel morphology, *Model studies, Mathematical models, Regime, Alluvial channels, Flow, Streamflow, Banks, Equations, Deposition(Sediments), Sedimentation, Tractive forces, Sediment transport, Erosion, Sedimentology.

Interest in the design of stable stream channels has been spurred by recent problems of channel stability on artificially straightened or newly constructed channels. Solutions are not readily available. This report the second of two papers dealing with stream channel stability, was based on data collected at straight, stable reaches of a large number of stream gaging stations in or near Oklahoma. Cross sections of two different straight, stable reaches at each station were used to calculate channel slopes, cross-sectional areas, and other characteristics. Samples of the bank and bed materials were analyzed for Atterberg limits, pH, particle-size distribution, angle of repose, and cation exchange capacity. The first paper presented a statistical evaluation of the relation between the channel characteristics and the characteristics of the bank and bed materials. This second paper presented the regime and tractive force theories of channel design, based on the assumption that the channels are in balance. It also related the bank and bed materials characteristics to the channel characteristics through the regime and tractive force equations of stable channel design. (See also W77-00775) (Sims-ISWS)
W77-00828

OBSERVED CHANNEL CHANGES IN A MOUNTAIN STREAM DUE TO INCREASED FLOW FROM TRANSBASIN IMPORTS,
Bureau of Reclamation, Denver, Colo. Flood Hydrology Section.
P. O. Abbott.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources

Council, Washington, D.C. Sedimentation Committee, p 5-25 - 5-36, 1976. 5 fig, 1 tab, 7 ref.

Descriptors: *Channel morphology, *Imported water, *Diversion tunnels, Water importing, Mountains, Streamflow, Streambeds, Flow, Channel flow, Scour, Erosion, Sedimentation, Projects, Tunnels, Diversion structures, Diversion.
Identifiers: Transbasin diversion.

In anticipation of increased flow in the channel of Lake Fork due to two recently completed transbasin diversions, data were collected on the flow, channel geometry, and bed composition of that channel for the pre-development period. During early stages of the new diversions, the effect of the increased flow in the channel was observed. After a period of years, during which these increased flows will be carried in the Lake Fork Channel, data will be collected which should throw additional light on the processes involved in mountain stream channel adjustment. (See also W77-00775) (Sims-ISWS)
W77-00829

APPLICABILITY OF THE UNIT STREAM POWER EQUATION,
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 2J.
W77-00830

CHANNEL CHANGES IN THE COLORADO RIVER BELOW GLEN CANYON DAM,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 2J.
W77-00832

MODEL STUDY OF RIVERBED MATERIAL IN CANYON FERRY DAM SPILLWAY STILLING BASIN,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 2J.
W77-00834

CHANNEL IMPROVEMENTS OF THE MISSOURI RIVER,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W77-00836

MILD SLOPE STABLE CHANNELS. A STOCHASTIC DESIGN APPROACH,
Florida Univ., Gainesville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-00896

COASTAL ENGINEERING DATA NETWORK,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 2L.
W77-00898

MODEL FOR A STUDY,
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 2L.
W77-00971

8C. Hydraulic Machinery

SEWAGE SYSTEM,
For primary bibliographic entry see Field 5D.
W77-00561

TANK CLARIFICATION PLANT,
Rice (F. B.) and Co., Balmain (Australia).
For primary bibliographic entry see Field 5D.
W77-00563

SLUDGE ELEVATOR FOR FLUID CLARIFICATION SYSTEM,
Cincinnati Butchers Supply Co., Ohio. (Assignee).
For primary bibliographic entry see Field 5D.
W77-00564

AUTOMATION IN SEWAGE PROCESSING,
Siemens A.G., Karlsruhe(West Germany). Measurement and Process Engineering Div.
For primary bibliographic entry see Field 5D.
W77-00586

INSTRUMENTATION IN THE WATER INDUSTRY.
For primary bibliographic entry see Field 5A.
W77-00601

DEMONSTRATION OF WATER QUALITY ENHANCEMENT THROUGH THE USE OF THE GARTON PUMP,
Oklahoma Water Resources Research Inst. Stillwater.
For primary bibliographic entry see Field 5G.
W77-00669

WAVE GENERATOR,
M. W. Gustafson, and K. R. Loqvist.
U.S. Patent No. 3,965,364, 5 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 947, No 4, p 1821, June 22, 1976.

Descriptors: *Patents, *Waves(Water), *Ocean waves, *Energy, *Energy conversion, Energy transfer, Floats, Floating, Buoyancy, Turbines.

A device for utilizing energy stored in wave motion is described. At least one buoyant body floating on the water surface and moving vertically with the waves is connected to at least one restraining energy recipient. The buoyant body or float is anchored in a way which permits unrestricted movement in an essentially vertical direction independently of the wave height and water depth when acted upon by the heaving waves. One lower member connected to the buoyant body is comprised of at least two oppositely rotating propellers on different vertical shafts. The propellers are positioned at a distance below the buoyant body which locates them fully or partially at a depth where the surrounding water has substantially no vertical motion. The reciprocating vertical motion generated by the waves, forces the propellers to rotate as they are being moved through the tranquil water layers. The propeller drive one common or two separate pumps which pump water into a pressure vessel that is partly filled with air. This vessel is connected to a water turbine. The turbine or the propellers can be used to drive an electric generator. (Sinha-OEIS)
W77-00691

POWER GENERATING MACHINE ACTUATED BY OCEAN SWELLS,
E. L. Parr.
U.S. Patent No. 3,965,365, 9 p, 14 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 947, No 4, p 1821, June 22, 1976.

Descriptors: *Patents, *Waves(Water), *Ocean waves, *Energy, *Energy conversion, *Energy transfer, Equipment, Floating, Buoyancy, Powerplants.
Identifiers: Ocean swells.

A power generating machine is actuated by the continuous swells occurring in the ocean. The machine is supported on a pair of spaced main floats, between which is a power float connected to a linkage which allows the power float to reciprocate vertically with the passing swells. A flywheel is driven through a one way clutch connected to the float linkage to drive an electrical generator, the linkage also being coupled to an air compressor. Sensing floats privotally attached to the main float support structure detect the contour of the swells and, through associated drive means, cause the spacing of the main floats to be adjusted to the existing swells crest spacing for maximum efficiency. (Sinha-OEIS)
W77-00692

LINE STATUS TRANSDUCER,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
U. Milano.
Report REC-ERC-76-17, October 1976. 9 p, 6 fig, 1 tab.

Descriptors: Voltage regulations, Electrical insulators, Transmission lines, Electronic equipment, Instrumentation, Power system operation.
Identifiers: Photoelectricity, High voltage, Capacitive voltage dividers, Transmission line status indicators, Insulator potential detectors, High-voltage dividers, Electrical status indicators, On-off potential detectors, *Transducers.

The line status transducer was developed to provide an inexpensive and reliable means of obtaining an indication as to whether an electric power system segment is energized or deenergized. Status information is derived from the voltage sensed across a modified electrical insulator. The insulating qualities of the insulator are unaffected by the addition of the sensor. The transducer can monitor any power system segment operating at or above 13.8 kV (line to line). Included in the report are descriptions of circuit functions, installation, alinement, and evaluation tests. (Bur of Reclam)
W77-00738

HYDRAULIC MODEL STUDIES OF NAVAJO DAM AUXILIARY OUTLET WORKS AND HOLLOW-JET VALVE BYPASS--MODIFICATIONS TO REDUCE DISSOLVED GAS SUPERSATURATION,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
P. L. Johnson.
Report REC-ERC-76-5, April 1976. 30 p, 19 fig, 2 tab, 2 ref.

Descriptors: *Supersaturation, *Dissolved gases, *Outlet works, Cavitation, Energy dissipation, Erosion, *Hydraulic models, Design, Model studies, Dams, *New Mexico, Jets, Valves.*
Identifiers: *Navajo Dam(N Mex).

Operation of the auxiliary outlet works and the 762-mm (30-inch) hollow-jet valve bypass at Navajo Dam results in high levels of dissolved gas supersaturation in released waters. These high dissolved gas levels, which are caused by the deep penetration of the flow into the spillway stilling basin pool, have had adverse effects on the fishery. Structural modifications were considered which included a flattening of the trajectory of the jet from the 762-mm (30-inch) bypass and the addition of a deflector or flip lip to the auxiliary outlet works. A 1:48 scale hydraulic model was used to refine and evaluate these modifications. Depth of jet penetration, degree of energy dissipation, strength of back eddies returning into the stilling basin, potential for cavitation development below the flip lip, and simplicity of design were factors considered in the evaluation. (Bur of Reclam)
W77-00739

THE ROLE OF SEDIMENT PROBLEMS IN HYDROELECTRIC DEVELOPMENT,
Federal Power Commission, Washington, D.C. Office of Energy Systems.
For primary bibliographic entry see Field 4D.
W77-00826

DESIGN LIMITS ON CRITICAL FLOAT EMERGENCE IN A TETHERED FLOAT BREAKWATER,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
D. M. Hanes, and R. J. Seymour.
Sea Grant Publication No. 44, IRM Reference 76-2, January 1976. 12 p, 4 fig, 1 tab, 3 ref. NOAA-04-5-158-20.

Descriptors: *Breakwaters, *Design criteria, *Engineering structures, *Shore protection, Floats, Barriers, Coastal structures, Ocean waves.
Identifiers: *Tethered floats, Wave attenuation, Ballast.

An investigation was undertaken to determine if a limiting relationship exists between the float diameter and the length of the ballast section in the beam direction. In a random sea, the ballast/float assembly attempts to follow the sea surface variations and to move towards an equilibrium between buoyant and inertial forces. Assuming a large number of floats per rigid ballast section, a fixed ballast length (B), and a constant volume of floats independent of float diameter (D), the attitude of the ballast can be considered to be nearly independent of float diameter. It was concluded under conditions of limited fetch and short wave lengths, selection of small float diameters and reasonable ballast lengths could result in a critical condition. Under ocean wave conditions, with the float diameters presently anticipated, the ballast section lengths required to yield a critical condition would far exceed the limits imposed by bending strength, handling and logistics. Therefore, it can be concluded that D/B ratio does not present a realistic design restraint on the tethered float breakwater except for smaller scale applications. (NOAA)
W77-00899

POWER FROM THE SEA,
For primary bibliographic entry see Field 3E.
W77-00977

8D. Soil Mechanics

EVALUATION OF IN SITU SHEAR WAVE VELOCITY MEASUREMENT TECHNIQUES,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
A. Viksne.
Report REC-ERC-76-6, April 1976. 40 p, 30 fig, 29 ref.

Descriptors: *Shear, Structural analysis, Borehole geophysics, *Dynamics, Earthquakes, Earth dams, Field tests, Test procedures, *Instrumentation, Elastic properties, Measurement, Embankments, *Seismic properties, Bibliographies.
Identifiers: Borehole probe, *Shear waves.

Several geophysical methods used by the Bureau of Reclamation to obtain the in situ shear wave velocity of earth embankments were evaluated. In situ low-strain shear wave velocity determinations have been performed on a number of existing zoned earthfill dams and an earth dam under construction. These field measurements of shear wave velocity by geophysical exploration methods have become an integral part and standard procedure at the Bureau for obtaining input parameters for dynamic analyses of earth dams. In the course of shear wave velocity measurements, various borehole methods, such as downhole, crosshole, and uphole, as well as seismic refraction have been used. Shear wave velocity measurements have been performed with explosive and nonexplosive impulsive energy sources using cased and uncased test holes. The results of these field studies have not only provided input parameters for dynamic analyses, but have also provided information as to which method or combination of methods should be used to obtain optimum results. Test methods and results of the various in situ measurements are compared and evaluated. (Bur of Reclam)
W77-00737

DESIGN AND PERFORMANCE OF ROCK REVETMENT TOES,
Army Engineer District, Kansas City, Mo. Hydrologic Engineering Branch.
W. M. Linder.
In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, 1976; Denver, Colorado, March 22-25, 1976. Water Resources Council, Washington, D.C., Sedimentation Committee, p 2-168 - 2-179, 1976. 5 fig, 1 tab, 1 ref.

Descriptors: *Riprap, *Erosion control, *Model studies, *Bank protection, Retaining walls, Rocks, Bank stabilization, Lakes, Rivers, Shore protection, Structures, Engineering structures, Erosion, Waves(Water), On-site investigations.
Identifiers: *Revetment toes, Rock revetments.

One of the major causes of failure of rock riprap revetments is undercutting or erosion of bank material below the base of the revetment. When this occurs, rock from the side slope migrates downward and exposes areas of unprotected bank, subjecting the entire revetment to progressive destruction. Several model and prototype tests of the performance of various shapes of revetment toes were performed. These investigations were described and conclusions were presented that can be drawn from the studies. The studies indicated that while shape was important, the volume of reserve rock provided in the revetment toe was probably more significant. Rock from a revetment toe generally migrated downward on approximately a 1Vertical on 2Horizontal slope to form a protective layer one to two rock diameters in thickness. Protection continued as long as there was sufficient rock remaining in the toe structure to prevent separation of the side-slope protection. (See also W77-00775) (Sims-ISWS)
W77-00807

8G. Materials

SCALE INHIBITION AND COMPOUNDS THEREFORE,
Nalco Chemical Co., Oak Brook, Ill. (Assignee).
For primary bibliographic entry see Field 5F.
W77-00686

LABORATORY AND FIELD INVESTIGATIONS OF NEW MATERIALS FOR ROOF CONSTRUCTION (PROGRESS REPORT),
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
B. V. Jones.
Report REC-ERC-76-4, April 1976. 58 p, 33 fig, 8 tab, 27 ref, append.

Descriptors: Rubber, *Elastomers, Polymers, *Protective coatings, Durability, Laboratory tests, *Performance tests, *Adhesives, *Roofs, Foam, Gravels, *Roofing materials, Silicone.
Identifiers: Rubber sheeting, Neoprene, Butyl rubber.

Materials properties and field performance for sprayed-in-place polyurethane foam and exposed elastomeric membrane roofing systems are presented. Field observations of a styrene foam protected membrane roofing system are discussed and system principles are reviewed. Studies of polyurethane foam systems include: effect of standing water and water vapor, freeze-thaw, system flammability, weathering and impact resistance of protective coatings, and preliminary correlation between impact test results and hail damage. Studies of exposed elastomeric membrane systems include physical properties tests, weathering, and rubber sheet-insulation board strength characteristics. Proposed criteria for USBR roofing are presented. The sprayed-in-place polyurethane foam and the styrene foam protected membrane systems were found to meet the proposed criteria with the latter preferred where design limitations will allow its use. (Bur of Reclam)
W77-00736

EVALUATION OF IN SITU SHEAR WAVE VELOCITY MEASUREMENT TECHNIQUES,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 8D.
W77-00737

GAGING SEDIMENT-LADEN FLOWS WITH V-NOTCH WEIRS,
Agricultural Research Service, Columbia, Mo. North Central Watershed Research.
For primary bibliographic entry see Field 2J.
W77-00845

INFLUENCE OF THE SUPRAMOLECULAR MARINE ENVIRONMENT ON PITTING CORROSION,
Texas A and M Univ., College Station. Ocean Engineering Program.
D. B. Harris, B. M. Gallaway, and J. B. Herbich.
Sea Grant Report No. TAMU-SG-76-211, August 1976. 49 p, 7 fig, 30 ref. Also as COE Report No. 192. SG-04-5-158-19.

Descriptors: *Corrosion, *Microorganisms, *Pitting(Corrosion), *Halogens, Ions, Metals, Estuarine environment.
Identifiers: Protista, *Pit nucleation, Passive films.

A mechanism is proposed for the process of corrosion pit nucleation in the marine environment. Rupture of the passive film is described in terms of its sensitivity to attack by negatively hydrated ions. A corollary is suggested which describes the inhibiting effect of various positively hydrated ions. The role of marine microorganisms is discussed as it relates to those environmental modifications that may contribute to pit nucleation. (NOAA)
W77-00890

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

FEDERAL WATER RESOURCES RESEARCH PROGRAM FOR 1973 AND 1974, COMMITTEE ON WATER RESOURCES RESEARCH OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY, (1976).
For primary bibliographic entry see Field 9D.
W77-00531

9D. Grants, Contracts, and Research Act Allotments

FEDERAL WATER RESOURCES RESEARCH PROGRAM FOR 1973 AND 1974, COMMITTEE ON WATER RESOURCES RESEARCH OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY, (1976).
Available from the National Technical Information Service, Springfield, VA 22161 as PB-595 518 $7.50 in paper copy, $3.00 in microfiche. National Science Foundation, Washington, D. C., 1976, 182 p, 2 append.

Descriptors: *Research and development, Water Resources Research Act, Federal Government,

*Federal budget, *Administrative agencies, *Federal project policy, Projects, *Research priorities, Comprehensive planning, *Government supports.
Identifiers: *Water Resources Research Program.

This report of the Committee on Water Resources Research (COWRR) of the Federal Council for Science and Technology (FCST) is the Committee's periodic statement on the status of water resources research in the Federal Government. The period covered is two years 1973 and 1974, with agency program reports presented on a calendar year basis and budget information on a fiscal year basis. The last published Committee report was the Federal Water Resources Research Program for 1971. The report for 1972 was not published but is availabl from the National Technical Information Service, Springfied, Virginia 22161 as PB 232 193. The water resources research program of each agency of the Government concerned with water is reported individually. A table lists the total water resources research expenditures by agency under the 10 FCST-COWRR categories. In addition those expenditures are summarized by categories and by agencies in tabular format.
W77-00531

TWELFTH ANNUAL REPORT, WATER RESOURCES RESEARCH CENTER.
Minnesota Univ., Minneapolis. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 723, Price codes: A05 in paper copy, A01 in microfiche. Bulletin 88, July 1976, 81 p, 19 ref. OWRT A-999-MINN(42). 14-34-0001-6024.

Descriptors: *Water Resources Institute, *Minnesota, Education, *Projects, Expenditures, Manpower, Management, Water pollution, Water Resources Research Act, *Research and development.
Identifiers: Applied research.

The fiscal year 1976 budget of the Minnesota Water Resources Research Center was $271,079. The Center supported 9 research projects involving 9 faculty members. These research projects were concerned with: developing a water resources research plan for Minnesota; developing indices for establishing water supply quality status and trends in Minnesota; analyses of organic carbon as a pollution index in Minnesota; bio-manipulation of Minnesota lakes for elimination of blue-green algae; social dimensions of water quality status and trends in Minnesota; assessment of water quality status and trends in Minnesota by remote sensing techniques; feasibility of using iron-ore overburden material as a media for disposal of secondary sewage effluent in northeastern Minnesota; effects of silt and turbidity from agricultural drainage on benthic invertebrates in streams in western Minnesota; and effects of drainage projects on surface runoff from wetland topography of the North Central Region. About 30 students received employment through the Center's program. During fiscal year 1976, there were 18 reports generated through research projects. (Waelti-Minnesota)
W77-00731

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

LIST OF PAPERS, 1967/1975, (INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH).
International Association for Hydraulic Research, Delft (Netherlands).
April 1976. 173 p, 4 append.

Descriptors: *Publications, *Bibliographies, *Hydraulics, Fluid mechanics, Research and development, Hydraulic models, Model studies, Hydrometry, Instrumentation, Measurement, Geographical regions, Water utilization, Mathematics, Information retrieval.

Listed were 2,090 papers presented at the biennial congresses and the various symposia of the International Association for Hydraulic Research (IAHR) from 1967 through 1975. The publication was divided into four Appendixes. Appendix I listed the papers in date sequence, arranged in alphabetical order by the names of the individual authors. The various papers were divided into 9 main groups of hydraulic subjects. Each main group was then subdivided into ten more groups. Appendix II listed the 9 main groups and their subgroups. The papers were listed alphabetically by author in Appendix III. In Appendix IV, the papers belonging to the various groups shown in Appendix II were listed. Also included was a list of publications available from IAHR. (Froehlch-ISWS)
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W77-00670 6F

Wisconsin Natural Resource Use Controls and Assistance.
W77-00915 6E

Erams Surface and Drinking Water Components, January--March 1974.
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Radioactivity in Kansas Surface Waters, January--December 1972.
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